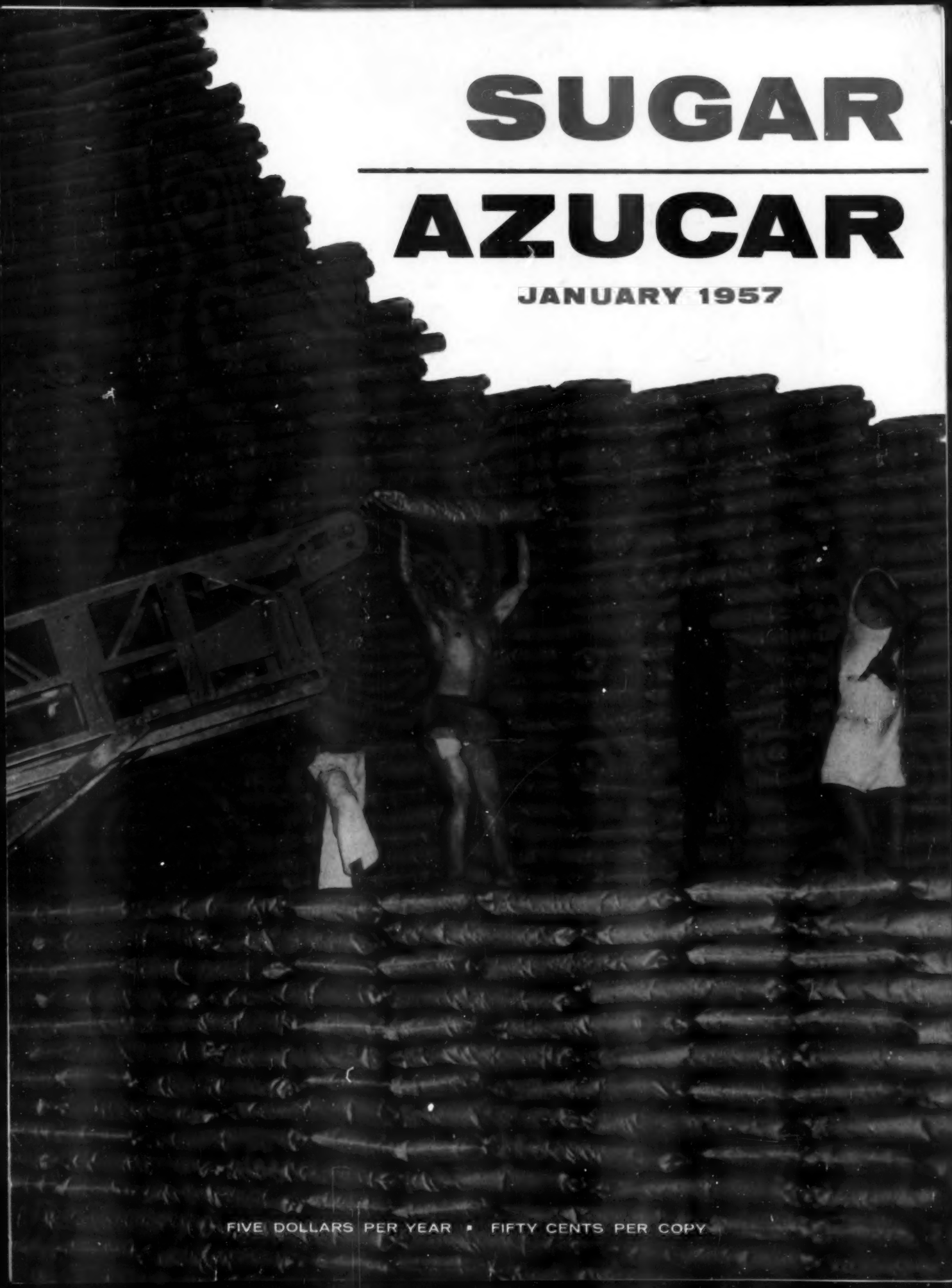
SUGAR

AZUCAR

JANUARY 1957



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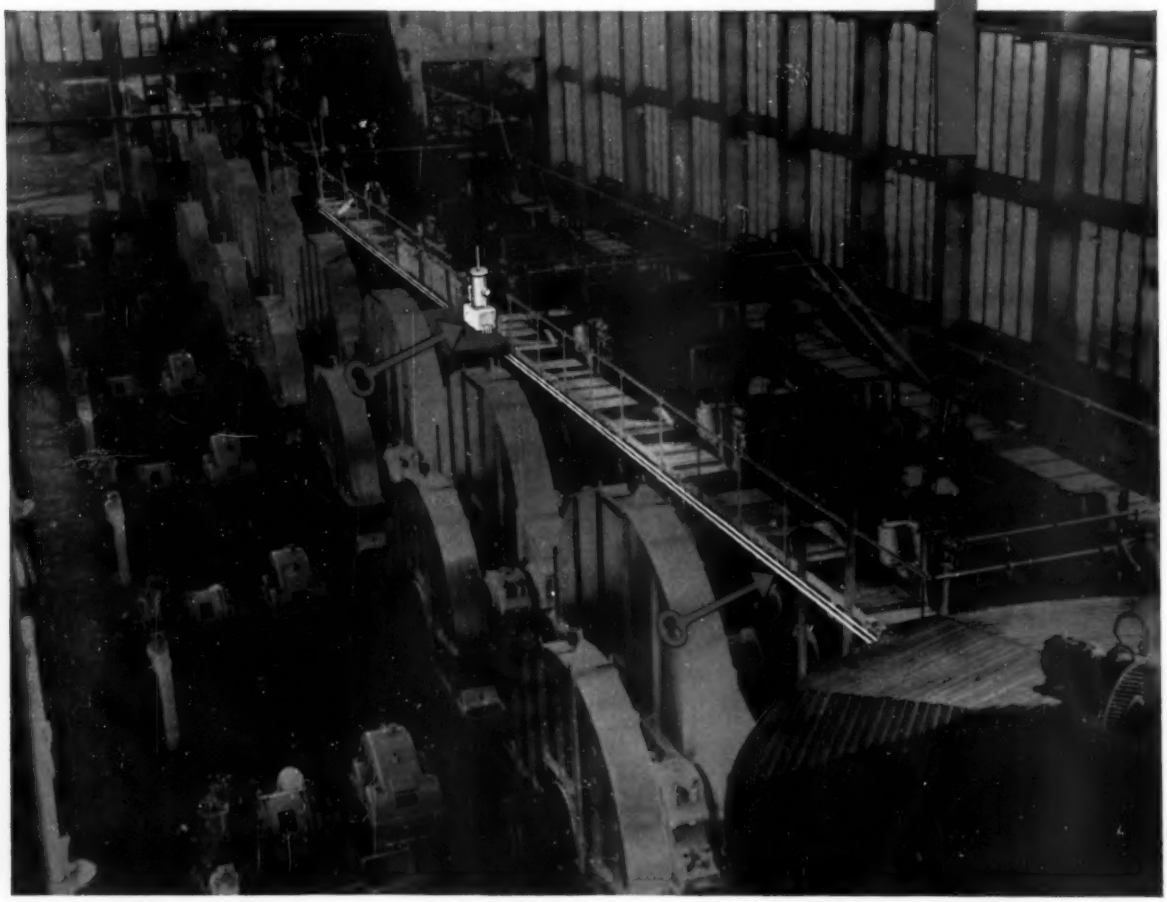
FARVAL—
Studies in Centralized Lubrication
No. 190



● This is the first all-turbine driven tandem in Brazil, built by the Fulton Iron Works and installed at Usina do Tamoio, near Sao Paulo. Like so many sugar mills built in recent years, its bearings have been protected from the start by a Farval Centralized Lubrication System.

But you don't have to wait for a new mill to enjoy the benefits and economies of Farval Centralized Lubrication. For example, on a Fulton-built mill at Central Hershey in Cuba, in service since 1916, a Farval system was installed in 1951. Each grinding system since then, Farval has paid for itself many times over—in lubricant saved, bearing expense eliminated, and even more important, increased sucrose extraction from the cane.

Proved in 28 years of service, Farval can improve the performance of any sugar mill, new or old. See what it can do for you. Consult the local Farval Sales Representative, or write for Bulletin 26-R.

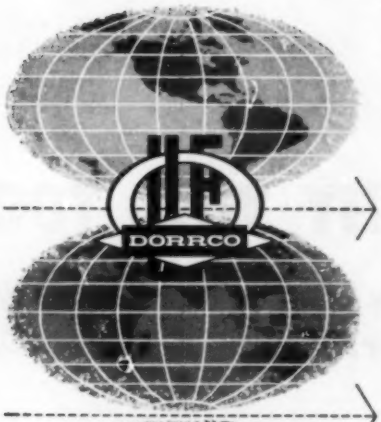
The Farval Corporation, 3277 East 80th Street, Cleveland 4, Ohio.

Affiliate of The Cleveland Worm and Gear Company, Industrial Worm Gearing. In Canada: Peacock Brothers Limited.

KEYS TO ADEQUATE LUBRICATION—
Wherever you see the sign of Farval—the familiar central pumping station, dual lubricant lines and valve manifolds—you know a machine is being properly lubricated. Farval manually operated and automatic systems protect millions of industrial bearings.

Here at Usina do Tamoio, grinding of 4,500 short tons daily is never interrupted for lubrication, because Farval is on the job.

FARVAL
CENTRALIZED SYSTEMS OF LUBRICATION



REVIEW and PREVIEW

1956 has, in many respects, been a record year for us . . . characterized by advances in technology and an all-time high in volume of new orders and also billings throughout the world. This meant a year of strenuous adjustment due to the necessity of increasing our productive capacity to parallel our growing volume of business.

The acquisition of the Merco Centrifugal Co. of San Francisco on February 1, added centrifugals to our product line. This natural outgrowth of our cyclone work has proven to be a most successful move. Similarly, the year has demonstrated the strength of our new Canadian subsidiary, Dorr-Oliver-Long of Orillia, which became the newest member of our corporate family on January 1, 1956. Yet another step in the overall corporate growth picture was the completion of plans to add the ninth member of our overseas family, Dorr-Oliver Pty. Ltd. of Australia on January 1 of 1957.

Steps in matching our productive capacity to our growing needs included a million dollar expansion of our Hazleton plant scheduled for completion at the year's end and the opening of a sizable new production facility nearby in Pennsylvania. Currently, a long term expansion and reallocation program is underway which will step-up our ability to produce, and to serve, still further.

Growth and change in other operating areas of the parent company also kept pace. A broad reorganization of our domestic sales structure added new geographical divisions and was principally designed for better sales coverage and service. In engineering, the pressure of increased volume resulted in the opening of a branch engineering office in Pennsylvania, close by our East Coast plants, which has proven to be most worthwhile.

FERTILIZER — One of the highlights of the past year was the largest single D-O order ever received involving a phosphoric acid and 200,000 ton per year triple superphosphate plant for a Florida producer. The scope of our services on this project includes architect-engineer design, supply of equipment and construction materials, and supervision of erection and initial operation of the plant.

Other major design projects undertaken during the year were a 350,000 ton per year complete granular fertilizer plant in Great Britain, a 350 ton per day ammonium phosphate installation in Montana, and a phosphoric acid plant for Venezuela designed to produce 50 tons of P_2O_5 per day. During the year construction of a D-O engineered Scottish granular fertilizer plant was virtually completed, and Traveling Pan Filters were ordered for the difficult gypsum-phosphoric acid separation in a number of chemical fertilizer plants around the world.

RESEARCH AND DEVELOPMENT — As a matter of policy, fundamental research continues on our expanding line of basic unit operations. The principle of operating in many different but allied fields stimulates situations wherein fundamental research can produce new and useful products and processes. Such is not possible when interest is confined to but a few basic operations, as in our early years.

Similarly, general company development is continuing the search for new products allied in some manner with our experience and facilities. In this search we count heavily on the assistance and cooperation of our Associates throughout the world.

FLUOSOLIDS SYSTEMS — A large steel producer in the United States finalized plans for a new fine coal washing plant using a two Reactor FluoSolids Coal Drying System designed to handle 600 tons of metallurgical coal per hour. In the non-metallics field, three fluidized Reactors went into operation — two in the Detroit area drying blast furnace slag used in cement manufacture, and the other calcining clay in Scotland. Systems are now under construction to dry and pre-heat oyster shells and to calcine Massachusetts limestone.

Four new installations in Japan will roast 265 tons of zinc concentrates daily, producing both a readily usable calcine and SO_2 bearing gases for contact sulfuric acid manufacture. During the year two installations in the U. S. and South Africa operated successfully roasting copper for direct electrowinning. And pyrite roasters were ordered for a Canadian uranium mill, Chilean and Nicaraguan copper concentrators, French and Philippine fertilizer plants, and two Scandinavian pulp mills. In all, 21 fluidized Reactors were sold in 1956.

STARCH — The addition of Merco equipment to the D-O product line has been of significant importance, particularly in the starch industry. Merco Centrifuges and DorrClone units comprise a new and complete D-O starch washing system, the first of which was ordered this year for an Illinois cornstarch plant. In this installation, which also represents one of the largest DorrClone orders to date, Mercos will handle gluten-starch separation and gluten thickening, while degritting and starch washing will be performed by DorrClone units.

In other parts of the world a similar Merco-DorrClone system has recently gone into operation in Canada and a large number of DorrClones and DSM Screen units are processing potato starch at a Dutch plant. In India, Merco Centrifuges and Mercone Screening Centrifuges, introduced last year, will wash starch and dewater fibre at a large cornstarch plant. Our Associates in The Netherlands have also received orders for DorrClone starch washing systems in Great Britain, Germany and Holland.

ALUMINA AND MAGNESIA — Plant expansions in both fields contributed heavily to the year's business as four of the world's major alumina producers in the Gulf Coast area and Jamaica ordered a total of 45 Filters, 20 Thickeners and 26 low pressure pumps of various types and sizes. In Michigan, three magnesia-from-brine plants will add a variety of agitation, filtration and thickening equipment; while a West Coast magnesia-from-sea water producer will employ extensive D-O equipment.

SANITATION — The new Spirovortex-Superate Filter will produce a degree of purity comparable to that attained using the activated sludge process in plants treating up to one MGD of domestic sewage. We have developed the Degritting Clarifier and Clarigester for low cost grit removal in small plants and during the year we have incorporated new features into the design of our Vacuum Filters for the sanitary field.

The completely D-O equipped sewage treatment plant for Karachi, Pakistan, represents the largest order in the sanitary field ever entered by our associates in The Netherlands. Typical of other new D-O equipped installations are those under construction in such diverse locations as Charlottesville, Virginia; Caldwell, Idaho; Midwest City, Oklahoma; Delhi, India; Nairobi, Kenya; and Rio de Janeiro, Brazil. Expansion of Providence, Rhode Island, treatment facilities calls for installation of nine Dorr Clarifiers, all over 100 feet square, and at Louisville, Kentucky, four 275 foot long Monorake units will be added.

SUGAR — Next year going into operation in Cuba and Puerto Rico will be the two largest complete RapiDorr Clarifiers constructed to date. Even larger is a 36 foot unit recently converted to RapiDorr design in the world's largest cane mill where thirteen thousand tons of cane are processed daily in four Dorr Clarifiers and four O-C Filters.

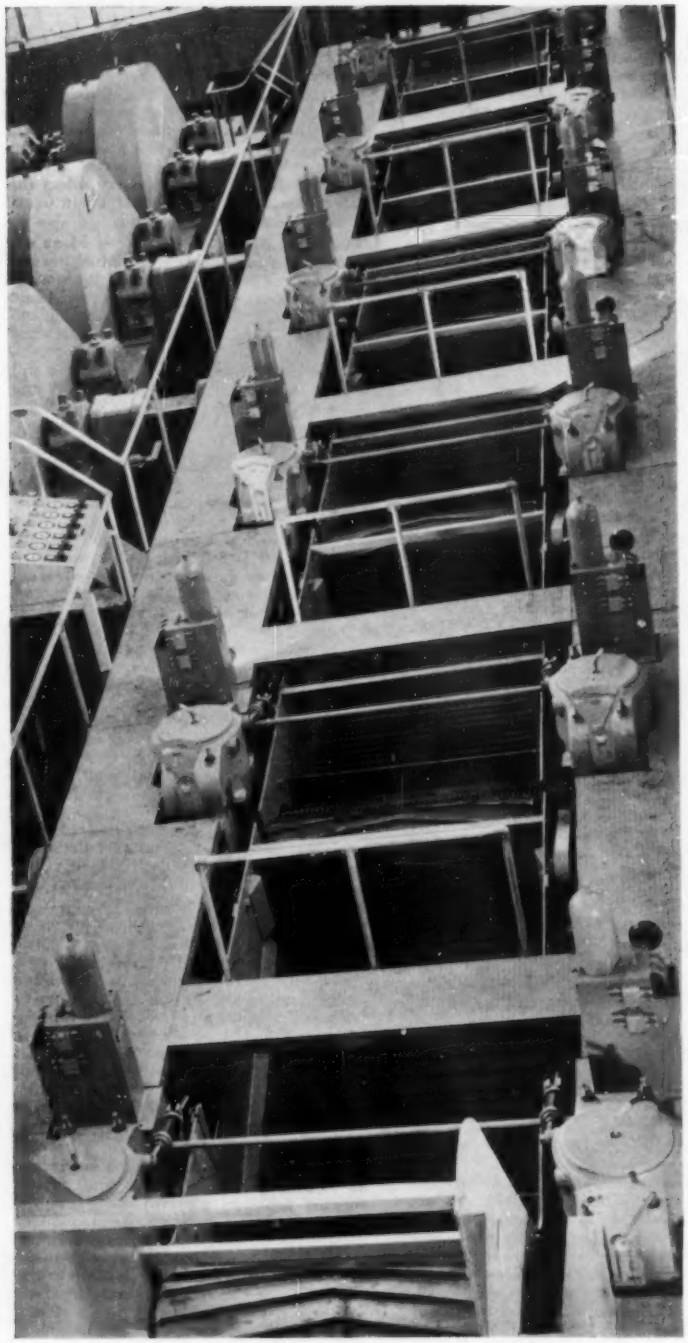
In the beet sugar fields of the western United States a number of First Carbonation Thickeners were converted to a new design substantially increasing capacity of existing units at minimum expense.

POLYETHYLENE — Our contribution to one of today's most spectacular and rapidly growing fields — polyethylene — is the Merco Pressure Centrifuge, developed specifically for high pressure, high temperature operation. The basic unit was developed, designed and manufactured in record time to keep pace with the expanding industry. First commercial Centrifuges will go on stream early in 1957 separating catalyst from liquid polyethylene.

The year's impressive record of sales and technical accomplishment has been made by the hard work of our staff in every corner of the globe. The success of our operations naturally rests wholly with them, despite the importance of the tangible facilities and tools with which we work. In the year now drawing to a close this was again demonstrated, and as the tools and facilities we give them expand and become of better quality, so will our staff be able to produce greater volume and increasing returns.

J. D. Hitch, Jr.
President

November 20, 1956



WHY YOU, TOO

should modernize with Farrel® sugar mills

During the last ten years Farrel has earned a reputation for introducing outstanding improvements in sugar mill design. That's why so many sugar factories modernize with Farrel — and why you should, too.

Among the many features of Farrel mills are one-piece construction of housing and bedplate, providing great strength and eliminating joints where corrosion can occur; top caps locked in place by keys which hold them in alignment; top roll boxes with ladder-type roller bearings that assure maximum freedom of vertical movement; improved piston-stem-type hydraulic ram mechanisms that maintain uniform roll pressure for maximum extraction, with freedom for self-alignment and roll float; force-feeding rollers installed on each intermediate carrier to assist in providing a uniform and compressed blanket to the rolls.

Although built for minimum maintenance, Farrel mills are designed for easy access to all parts which might require attention. Intermediate high-side carriers can be lifted out as units. Mill side caps are hinged and swing outward and down to form platforms on which the side rolls can be removed and lifted out vertically.

These design advancements will give you high efficiency with less personnel required. Send for details.

FARREL-BIRMINGHAM COMPANY, INC.
ANSONIA, CONNECTICUT
Plants: Ansonia and Derby, Conn., Buffalo and Rochester, N.Y.

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FB-1112

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JANUARY, 1957

SUGAR INCLUDING EL MUNDO AZUCARERO

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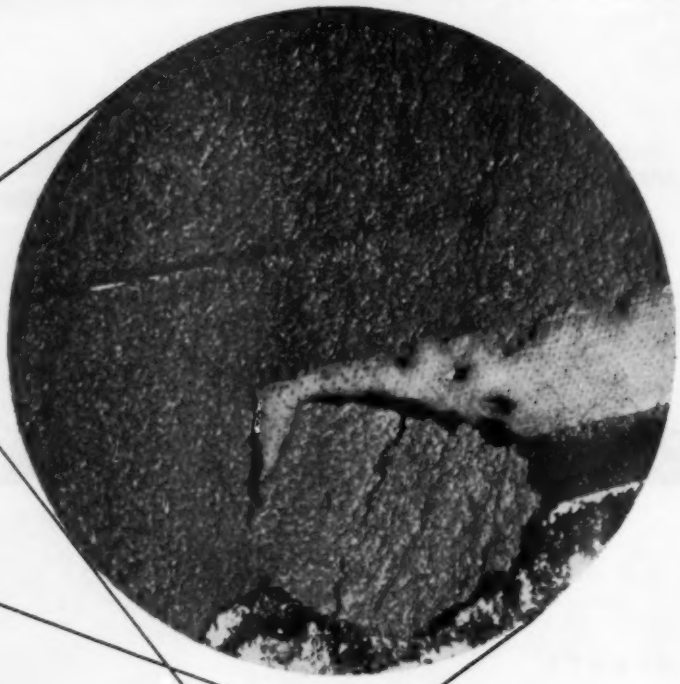

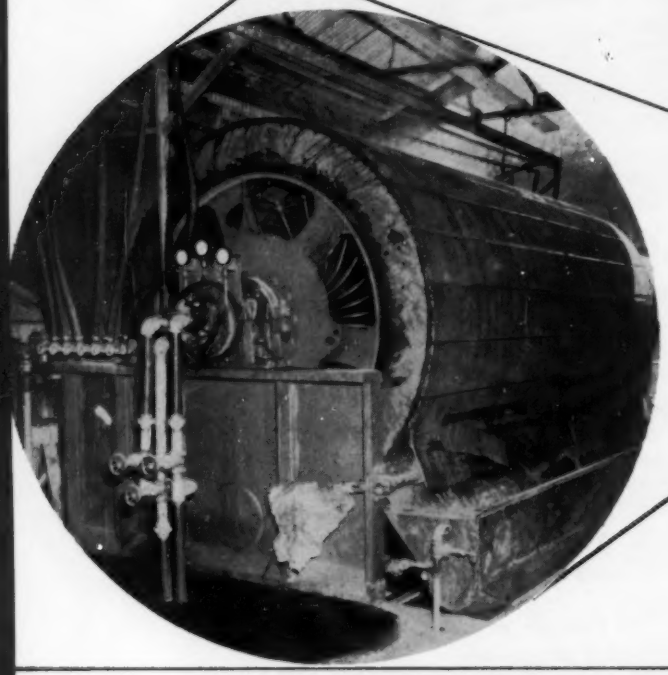

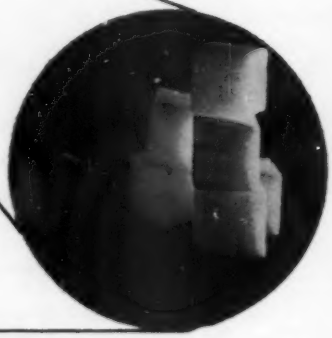

EIMCO SUGAR FILTERS GET BETTER RESULTS

Eimco Sugar Mud Filters give you a greater return on your investment through savings from (1) less labor requirements, (2) non-corrosive materials, (3) sugar gained in filtering cane muds, (4) reduced molasses loss in filter cake and (5) less recycling due to higher filtrate purity.

Here are some advantages of the Eimco Sugar Filters operating in competition with the filter press station:

EIMCO SUGAR FILTERS		PLATE AND FRAME PRESS FILTER
Short filter cycle (3 to 9 minutes). Less inversion of sucrose and less re-absorption of impurities.	INVERSION	**Long filter cycle (2 to 4 hours). More inversion of sucrose and more re-absorption of impurities.**
It takes fewer gallons of wash water per hour per sq. ft. of filter area to wash Eimco cake to a low sucrose percentage.	WASHING	**Press cake contains 5 times more sucrose with more wash water gallonage per hour per sq. ft. of filter area.**
Less inversion and re-solution of non-sugars result in greater filtrate purity.	FILTRATE PURITY	**Greater inversion and re-solution of non-sugars cause drop in purity.**
Clean filter station. Loss due to leaks, spillage, washing of filter cloths is entirely eliminated. Continuous operation.	OPERATING EFFICIENCY	**Considerable amount of unfiltered settlings spilled when press is opened or filter medium is cleaned.**
Seldom requires maintenance during campaign. Permanent metal media. Labor savings (one man part-time).	MAINTENANCE AND REPAIRS	**Annual maintenance and repair costs are high. Requires more labor (two men full time).**
Cake efficiently washed to eliminate disagreeable odor associated with press cake. Handles easily. May be stock piled or spread over fields as fertilizer. Uniformity permits accurate account of sucrose recovery.	FILTER CAKE	**Extremely disagreeable odor. Cake is often sloppy as cake center is usually softer than outside. Increases handling difficulty, makes sampling for sucrose loss inaccurate.**

Let Eimco furnish you a prepared form whereby you may easily calculate the factors entering into the recovery of sucrose from mud settlings.

You will see the direct advantages of modernizing your sugar operation with Eimco Sugar Mud Filters.

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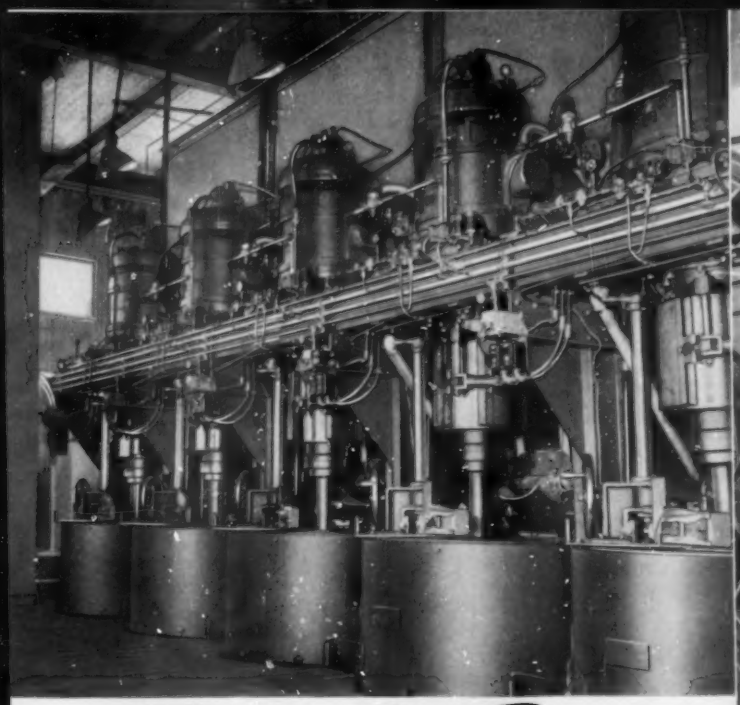
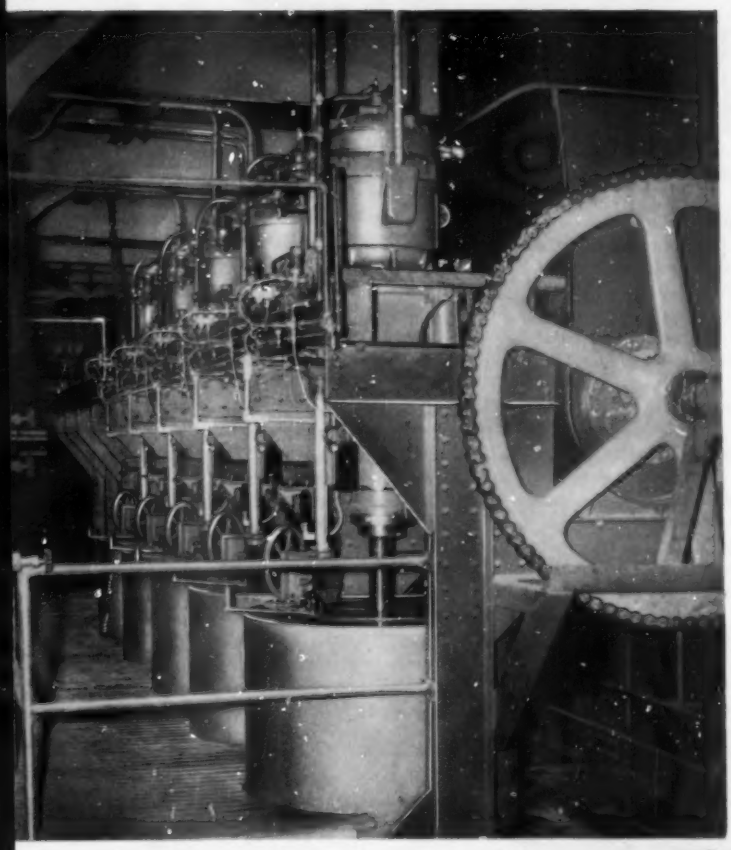


Fluid Drive



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HAVE A PLACE

Each year a large number of Roberts Fluid Drive Centrifugals are purchased by the world's sugar industry.

Despite the growing interest in complete automation with continuous batch centrifugation, many factories find in the Fluid Drive the ideal answer to their centrifugal needs.

BECAUSE . . .

They are simple . . .

A standard single speed, normal torque, normal starting current motor is employed. A four position master switch is manipulated for operating. The basic machine requires but few accessories.

They are sturdy . . .

Heavy duty construction and oil cushioned operation result in long life. To date, sixteen years after the first installation, not one Fluid Drive has worn out.

They are flexible . . .

Top speeds may be varied, rate of acceleration may be adjusted, and most any desired degree of automation may be attained.

They are economical . . .

First cost is relatively low and maintenance is relatively simple.

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HAMILTON, OHIO, U.S.A.

ASK US ABOUT THE ROBERTS FLUID DRIVE CENTRIFUGAL . . . IT CAN DO A JOB FOR YOU.

WASHINGTON sugar bowl

By David Fernsler

WASHINGTON — Everybody had been talking about what had been going on in the Mississippi Valley; Gulf refiners melting about 200,000 tons more in the first nine months of what proved to be a nine-million-ton quota year; invading beet territory, sending some of it up the river by barge to Chicago, the "home of homeless sugars"; Louisiana growers cutting down some of the surplus that had been hanging over them. So, it was in New Orleans, that the jump to 9,000,000 tons with the U. S. Agriculture Department's blast at high prices caught up with us.

Larry Myers is waging a one-man war against inflation, was one quick comment. Others who would not be quoted suggested that someone in Washington had "blown his top." Generally, it was agreed that about 200,000 tons must have gone into inventory. What that would mean for 1957 and whether there might be a cut in consumption estimates sometime next summer, was discussed with no meeting of the master minds.

Wallace C. Kemper, president of Southdown Sugars Inc., suggests, by the way, that the common estimate of 135,000 tons a year for population increase may be dated. He thinks that 175,000 or 200,000 tons may prove more realistic.

There could be no misunderstanding the Department's November 30 announcement of a quota increase of 125,000 tons. "Supplies previously made available appear adequate," it said. "However, sugar prices have risen and further rises in the price of refined sugar have been announced. This action is taken for the purpose of checking the upward price trend and of providing even more ample supplies to consumers."

Louisiana is a tight little sugar empire, bringing in a good crop although acreage had been cut between 17 and 18 percent and the thermometer went down to as low as 23 degrees with little apparent damage. The state expected to come into 1957 with about 330,000 tons of sugar, about 160,000 tons above normal carryover.

Gulf refiners appear rather amused at the attention their enterprise has commanded. They are in the refining business and the only way to stay in the refining business is to refine sugar. Which is what they did in 1956. But the possibility that proposals for regulation or control of ports of entry of offshore sugar will be advanced when next the Sugar Act comes up for amendment is not being overlooked.

Sugar cane came to Louisiana in 1751. The monks brought it here from Santo Domingo. It was used primarily for chewing purposes and making taffia until 1795 when **Etienne de Bore** developed a way to produce sugar on a commercial scale from sugar cane. Some of the cane fields are within 20 miles of New Orleans.

Representative of most of the Louisiana growers is the American Sugar Cane League with **F. A. Graugnard, Jr.,** as president and **Gilbert J. Durbin,** a vice-president as general manager. About 7,200 of the 7,400 Louisiana growers as well as the 49 mills of the state are members. Here also they make paper from bagasse including newsprint to which a number of Louisiana weeklies have turned.

Durbin, **Lloyd L. Lauden,** the League's agronomist and former professor at Louisiana State University, and **A. W. Dykers,** executive secretary of the Louisiana Sugar Exchange, Inc. were all guarded in their comments on the quota boost to 9,000,000 tons. They showed no reserve, however, in discussing the present and future of the Louisiana sugar industry.

"The people who work with the Louisiana sugar industry believe in it implicitly," said Durbin. "During the past century and a half their industry has survived just about all the calamities that could befall a major farming enterprise. Wars, floods, freezes, diseases and adverse legislation have all been met and conquered, and today the Louisiana sugar industry is in a stronger position than ever before.

"Despite the fact that some parts of the sugar district suffered a prolonged drought during the growing season; that Hurricane Flossy flattened much of the cane in another section; and that freezes in November killed practically all of the cane standing in the fields. Louisiana in 1956 will turn in a near-record yield of about 24 tons of cane per acre averaging about 176 pounds of sugar per ton of cane, which will be the highest yield of sugar per ton of cane on record.

"Thanks to the new sugar legislation, Louisiana is now allowed to produce more sugar as the consumption in this country advances and some time in the not too distant future we should recover the acreage taken from us because of the production restrictions imposed before the present Sugar Act became law.

"Our only fear is that the powers that be in Washington will keep the price of sugar so low that our farmers will lose their incentive to improve. This could happen, but we are hoping that it won't."

Durbin and Lauden agreed that "possibly the most substantial reason for optimism about the future of the Louisiana sugar industry lies in the progressiveness of the cane farmers."

"Research has saved the Louisiana cane industry from extinction," Durbin declares. "Some of the most capable agricultural scientists in the world are working in our behalf. The cooperative cane breeding and testing program is an example of one of the phases of our sugar cane research. Today the scientists who saved us have reached a point in their rehabilitation work where they can spend more time in developing new cane-breeding techniques and in carrying out a long-term plan of variety crosses which, according to the laws of genetics, should give us much better cane varieties in the future than anything we had had to date.

"In 1953, **Dr. E. V. Abbott,** superintendent of the USDA Sugar Cane Field Station at Houma, Louisiana, became convinced that cane growers had suffered for many years from a disease known as the 'Stunting Disease.' Research workers promptly developed a method for controlling this by subjecting canes ready for planting to hot air in specially constructed ovens. Today these ovens are in use all over the Louisiana sugar belt and the results show that an increase of from four to seven tons of cane per acre may confidently be expected from canes free from the disease.

"Another scientific achievement of great import has been the success obtained by **Dr. S. J. P. Chilton,** head of the Department of Plant Pathology of Louisiana State University, in causing canes to flower by the use of controlled light. This technique has greatly increased the possibility of crossing canes for the development of better varieties that will eventually bring about a substantial increase in Louisiana's production of sugar per acre."

Such is the Louisiana story . . . In the old French Quarter a sign on one of the shops that crowd close upon one another reads, "Sugar Bowl—Cleaning, Pressing and Alterations" . . . The Louisiana State Penitentiary has a sugar quota of nearly 4,000 short tons. . . . The State University, a little more than 100 short tons.

And from the Pacific Coast comes word that a landmark, the Club House on the factory grounds at Oxnard, California, has been razed. Built in 1898, it was used solely to house visiting dignitaries in the sugar industry before there was a town of Oxnard. . . . The first grower of sugar beets in Nevada, where production was resumed on a small scale in 1956, was a woman, **Anne Ville,** a resident of the village of Winnemucca. Between 1888 and 1892 she went around planting sugar beet seed in her garden at home and in plots on various farms in Paradise Valley, at Humboldt, at Rye Patch and in Lovelock.

To withstand heavy service . . . reduce shutdown time, use

LINK-BELT intermediate carrier chain

Intermediate carrier chain 901-E42 and style DB slats (shown in phantom), with laps trailing. Direction →→ of travel.

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Use this especially designed chain for your toughest intermediate carrier requirements. Projections on sidebars form outboard driving lugs to accommodate double sprocket wheels . . . end bagasse jamming between chain and sprocket. Wearing shoes prevent tilting, reduce joint wear.

Little wonder so many sugar mills standardize on this Link-Belt chain. It is offered in Nos. 901, 902 and 907 sizes in malleable iron, Promal, bronze or stainless steel.

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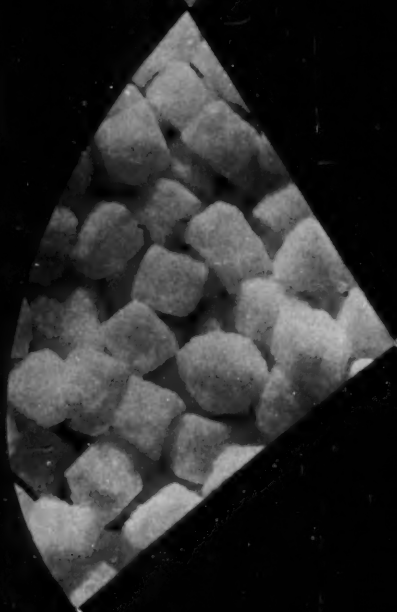

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completely free of false grain.

Manufactured with VMF equipment.

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FOR ALL SUGAR BUSINESS APPLY TO GEBR. STORK & CO N.V. HENGELO NETHERLANDS

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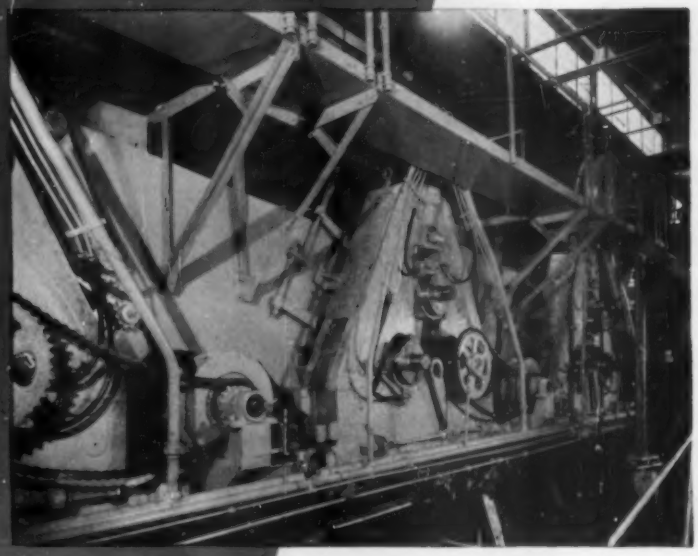
1857
SQUIER
1957

"FROM CANE TO SUGAR BAG"

Squier Cane Feed Tables deliver cane to Squier Levellers and Cane Knives in an even, uniform flow.

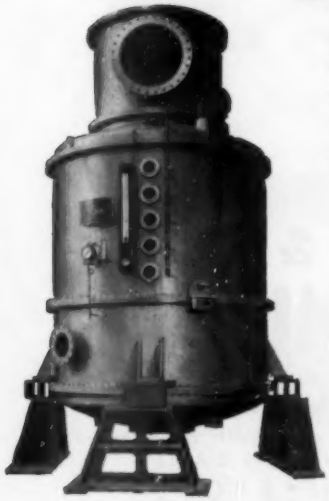


Squier Triangular-Stress Cane Mills exert even pressure on cane for highest possible extraction.

SQUIER SUGAR MACHINERY

For your present or future requirements, write "Squier" into your plans . . . for the finest machinery available to the cane sugar industry.

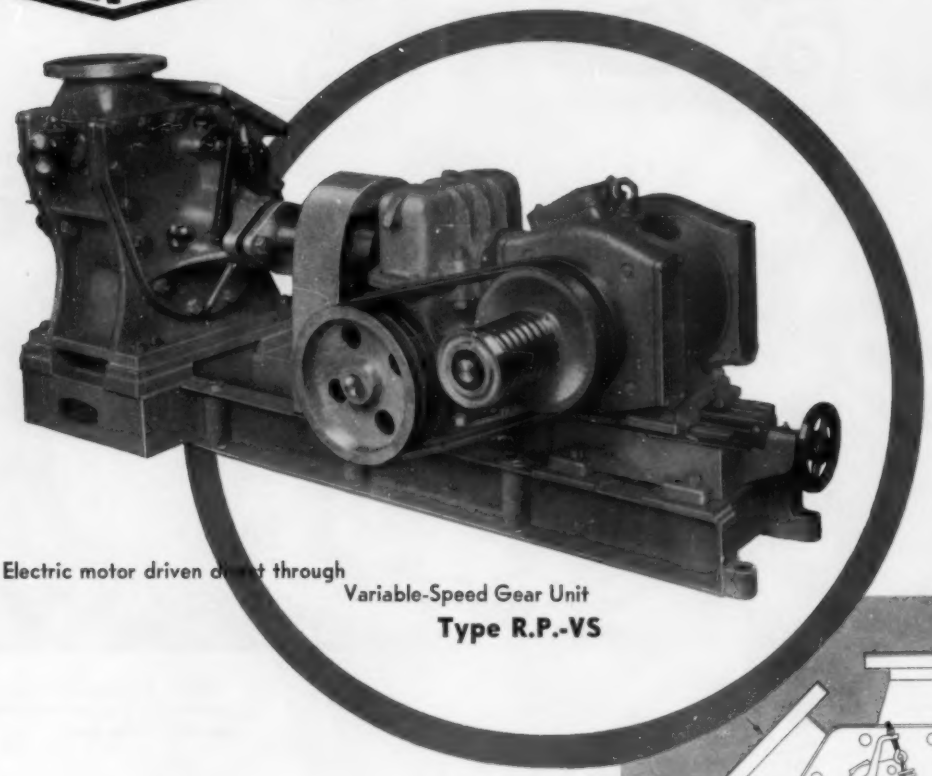
Squier Dryers produce evenly dried, free-flowing crystals at low heating and maintenance costs.



Squier Vacuum Pans provide natural, rapid circulation for fast strikes.

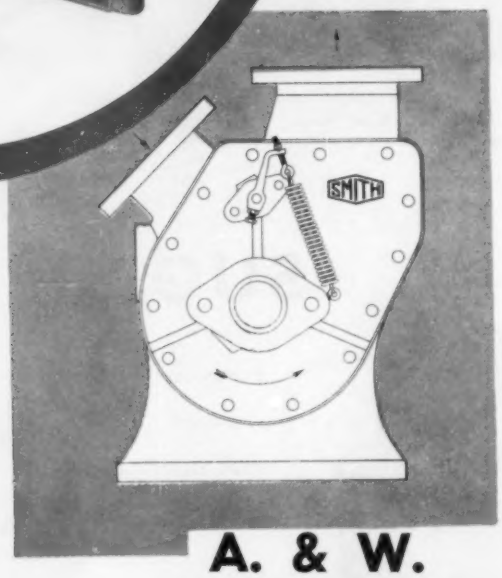
THE SQUIER CORP.
ENGINEERS AND MANUFACTURERS
BUFFALO, NEW YORK, U.S.A.

SMITH ROTA PUMPS



Electric motor driven direct through
Variable-Speed Gear Unit
Type R.P.-VS

FOR
MOLASSES,
MASSECUITE
AND
OTHER
VISCOUS
LIQUORS



Other types available

R.P.-S

With bare shaft extension.

R.P.-B

Belt driven through spur reduction gear.

R.P.-MV

Electric motor driven through V-rope and spur reduction gear.

R.P.-MW

Electric motor driven direct through worm reduction gear.

A. & W. SMITH & CO. LTD.

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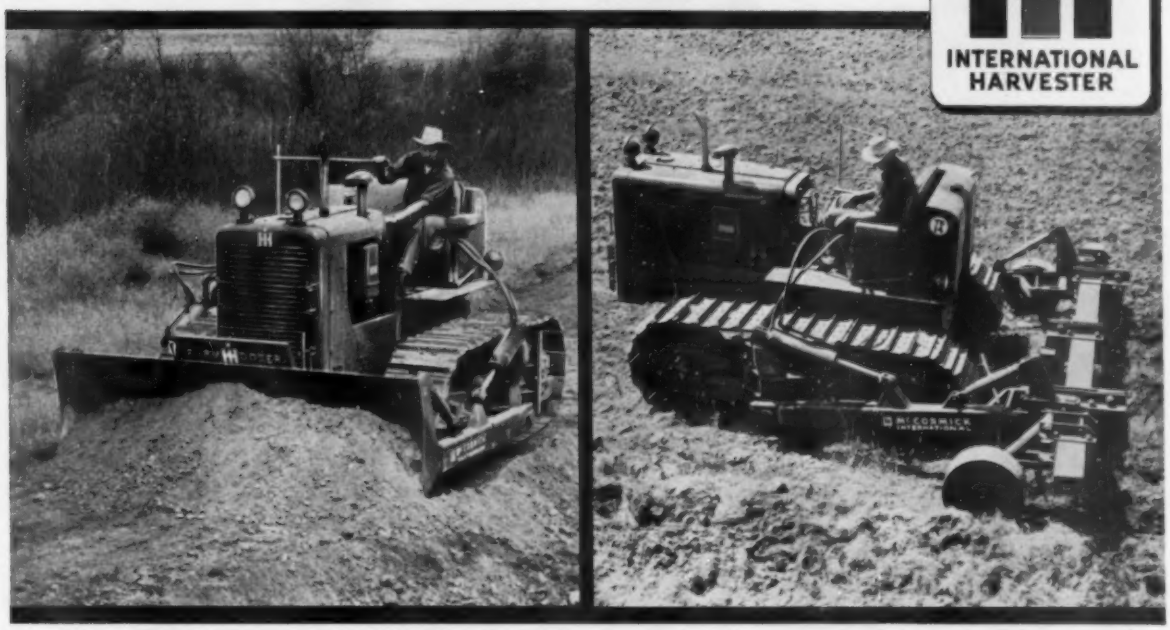
McCormick International

COMBINATION FARM DOZER-TOOL BAR

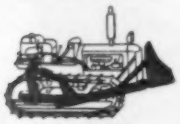
for International TD-6, 9, 14 and 18 Diesel Crawler Tractors

INTERNATIONAL HARVESTER

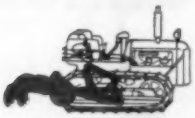


Low-cost farm dozing...tool bar tillage unlimited ...all with one basic carrier!

interchangeable



in just a few



minutes

Here is a multi-purpose combination carrier for tillage implements and farm dozer that will keep both ends of your crawler tractor busy. Hydraulically powered and driver controlled, the strong side booms are tool bar draft arms and farm dozer-blade push bars. You just head in for dozing . . . back in for tillage.

You can choose from a wide selection of attachments to handle any job: ditch, doze, clear brush, move dirt, chisel, subsoil, stubble-mulch, middlebust, furrow, cultivate and bed.

See your IH distributor soon for all the money-saving, profit-building details on this tool bar and dozer combination. International Harvester Export Co., 180 N. Michigan Ave., Chicago 1, Ill., U. S. A.

INTERNATIONAL HARVESTER

Here are three of the many implements available: (1) Middlebuster and stiff shank attachment. Lets you deep-chisel to aerate and store moisture. Unit shown has 5 middlebusters and 4 straight stiff shanks on tool bar. (2) Tool bar with two sets of bedder disk attachments. Various bar lengths available to allow bed width adjustment and spacing between beds. (3) Stiff shank and coil shank attachment. Lets you do two jobs at once. Stiff shanks cultivate at 12-14 inches. Coil shanks cultivate at medium depth.

An answer to refiners' worries!

NORIT announces a new thrifty way of application

Sugar refiners, employing phosphoric acid and lime treatment in continuous clarifiers to cut down the activated carbon bill, can still **economize some 25 % more** on carbon by using NORIT, according to the **new developed method,** for which patent has been applied for.

NORIT

Write for full particulars!

AMERICAN **NORIT** COMPANY, INC. - JACKSONVILLE 8 - FLORIDA
UNITED **NORIT** SALES CORPORATION LTD. - AMSTERDAM - HOLLAND

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To help make its millions of tons of steel each year, Bethlehem imports raw materials from 41 countries around the globe.

We must have, for example, such products as chrome, tin, tungsten, manganese, fluorspar, hemp, rubber, paper pulp, and chemicals. Some of these actually go into the steels we make; others are required for plant operations that contribute to steel-production.

You know Bethlehem as one of the foremost producers of steel and steel products. But think of Bethlehem, too, as a large-scale customer in many different markets all over the world. Bethlehem Steel Export Corporation, 25 Broadway, New York 4, U.S.A. Cables: "BETHLEHEM, NEWYORK."

Bethlehem's great Sparrows Point plant in the Port of Baltimore, U.S.A., is the world's largest steel mill located on tidewater. Products for export can be loaded from this plant directly aboard ship.

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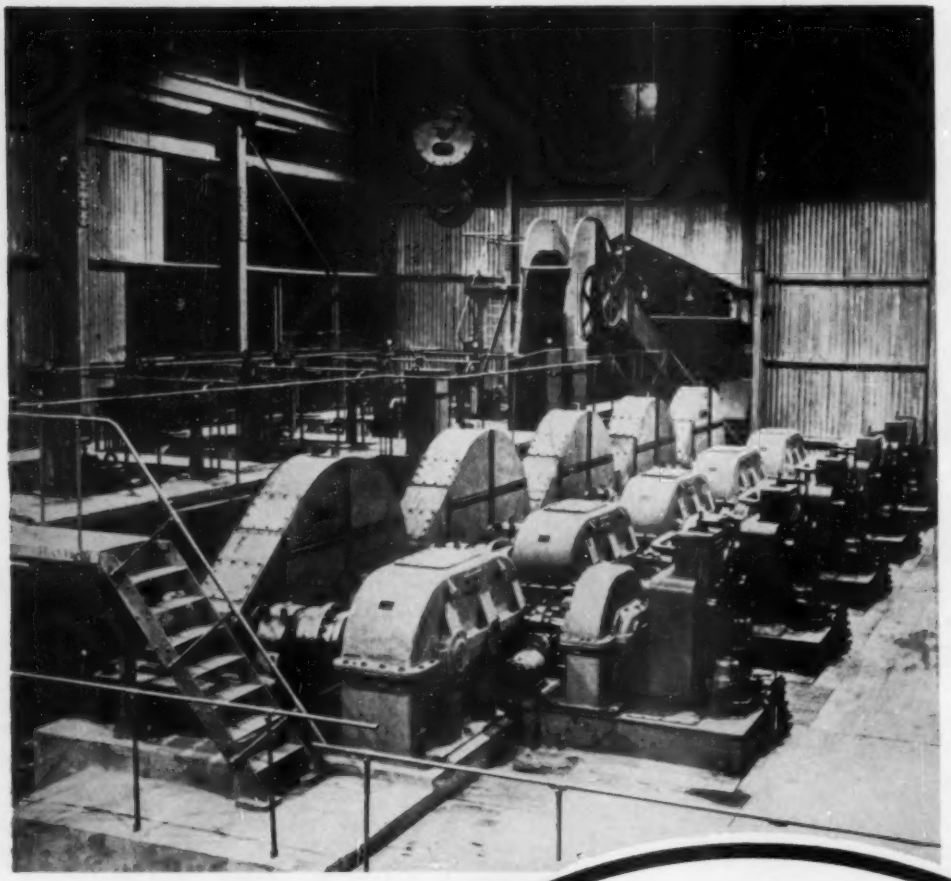

26" × 36" 15 - roll cane mill at Ureña, driven by five 148 HP individual steam turbines.

Within a period of 18 months

Cie de FIVES-LILLE has :

- set up the foundations
- manufactured
- shipped
- assembled

} the equipment

for the

Ureña Sugar Factory - Refinery

(Venezuela)

EVERY MACHINERY FOR SUGAR FACTORIES REFINERIES DISTILLERIES

Cie DE FIVES-LILLE

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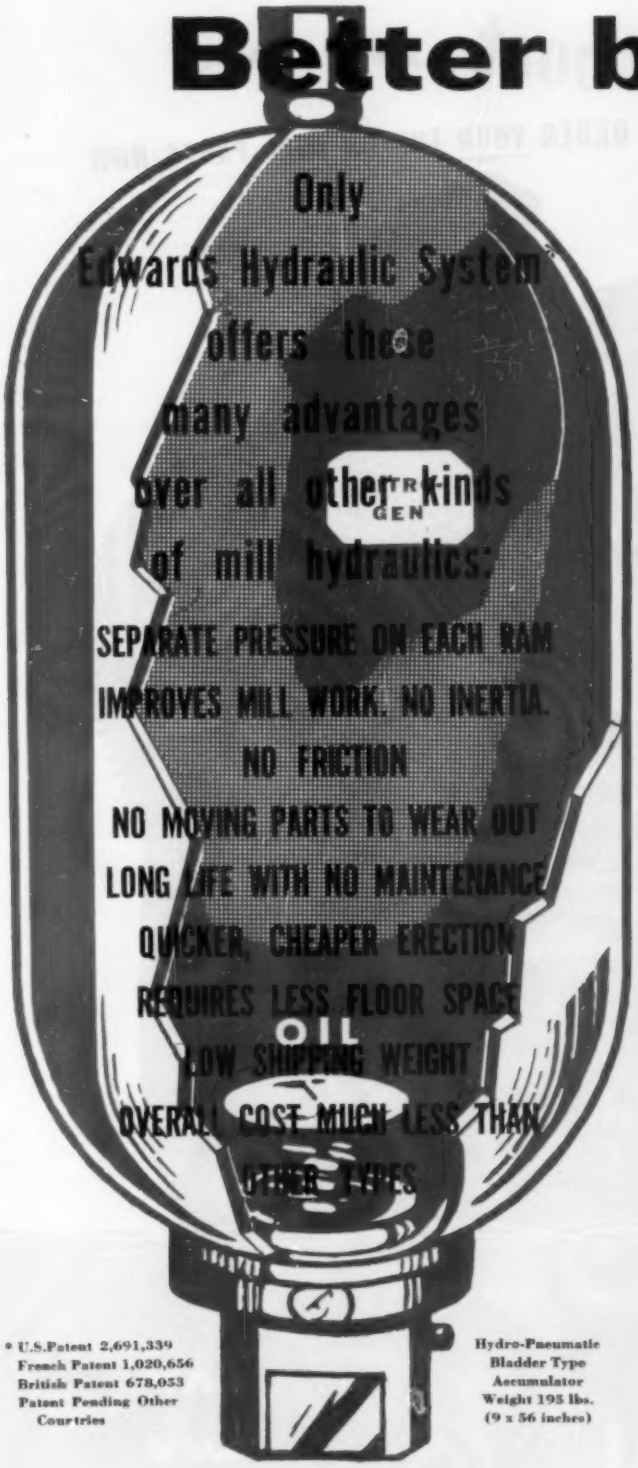
Better by far!



* U.S.Patent 2,691,339
French Patent 1,020,656
British Patent 678,053
Patent Pending Other Countries

Hydro-Pneumatic Bladder Type Accumulator Weight 195 lbs. (9 x 56 inches)

Acceptance:

Wherever cane sugar is grown, you'll find Edwards Engineering representatives and agents nearby:

Edwards Engineering Corp. — CUBA, Porto Rico Iron Works, Inc. — PUERTO RICO. H. E. Robinson & Co. (Jamaica) Ltd. —JAMAICA. H. E. Robinson & Co., Ltd.— TRINIDAD. Guy de Jaham — MARTINIQUE. Law & Connell, and D. M. Simpson Co. — BARBADOS. Ets. Souquet-Baseige—GUADELOUPE. Sandbach, Parker & Co. Ltd.—BRITISH GUIANA. Cia. Importadora de Maquinaria—EL SALVADOR. Kepaco S. A. — GUATEMALA. Ingenieros Azucareros S. A. — MEXICO. Cia. Importadora de Maquinas "Comac," Mario Dedini, Marne Ltda., Jayme Machado — BRAZIL. H. & O. Romer, Sucr. — VENEZUELA. Eduardo A. Tate, Ing. — ARGENTINA, PARAGUAY AND URUGUAY. General Sales Corp. del Occ. Ltda. —COLOMBIA. Honolulu Iron Works Co. —HAWAIIAN ISLANDS AND PHILIPPINE REPUBLIC. Edward L. Bateman (Pty) Ltd.—UNION OF SOUTH AFRICA. Dorr-Oliver (India) Ltd.—INDIA AND CEYLON. Bundaberg Foundry Coy, Ltd.— AUSTRALIA. Ireland, Fraser & Co. Ltd.—MAURITIUS.

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Edwards-equipped sugar factories around the world:

Area	No of Factories
LOUISIANA AND FLORIDA	34
PUERTO RICO	23
HAITI	1
VIRGIN ISLANDS	1
MEXICO	29
CUBA	25
DOMINICAN REPUBLIC	6
BRITISH GUIANA	6
COLOMBIA AND ECUADOR	11
BRAZIL AND VENEZUELA	14
PERU AND BOLIVIA	7
BRITISH WEST INDIES	24
FRENCH WEST INDIES	7
CENTRAL AMERICA	18
TERRITORY OF HAWAII	13
INDIA	52
MAURITIUS AND REUNION	12
AUSTRALIA	7
PHILIPPINE REPUBLIC	8
AFRICA	8
PAKISTAN AND BURMA	5
Total Factories to date	311

* *Names of persons on request.*

Exclusive world-wide distributor of GREER ACCUMULATORS of the sugar industry!

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ORDER YOUR FULTON MILL PARTS NOW
You can't grind next season's crop with mill parts that haven't arrived.
Avoid delivery delay. Survey your needs, and order now. Make sure those needed parts reach you for installation before the milling season starts.
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ENGINE PARTS
CRUSHERS
. . . AND ORDER TODAY!
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PRESTE ATENCIÓN

In planning your new centrifugal station be sure to investigate the newest automatic features in the sugar centrifugals developed by the Fletcher Works, U. S. A.

Take full advantage of Fletcher's century of know-how as a leading manufacturer of centrifugals for the sugar, chemical and other industries. For full information write:

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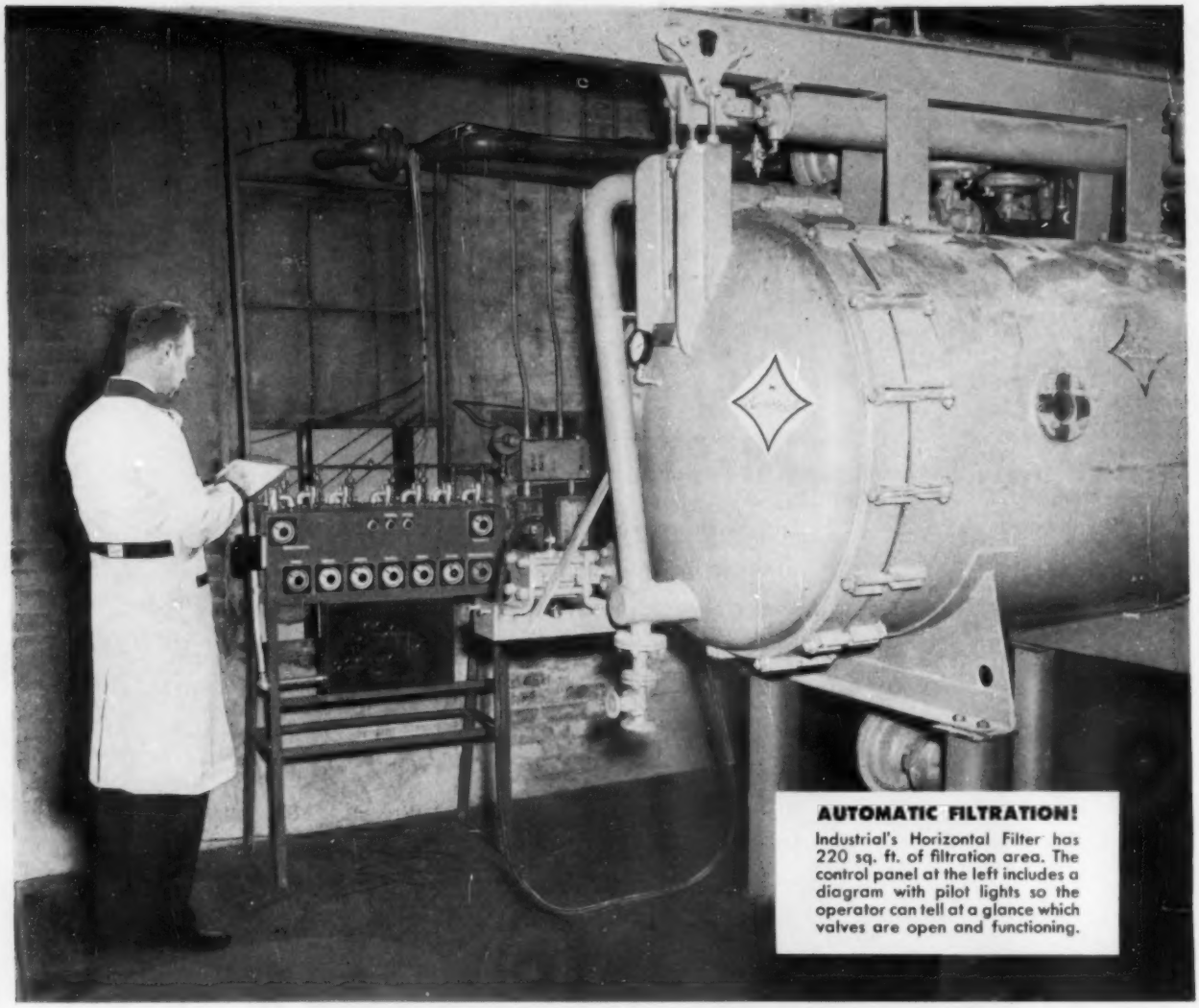


AUTOMATIC FILTRATION!
Industrial's Horizontal Filter has 220 sq. ft. of filtration area. The control panel at the left includes a diagram with pilot lights so the operator can tell at a glance which valves are open and functioning.

Different stations . . . different liquors . . . ALL BY INDUSTRIAL

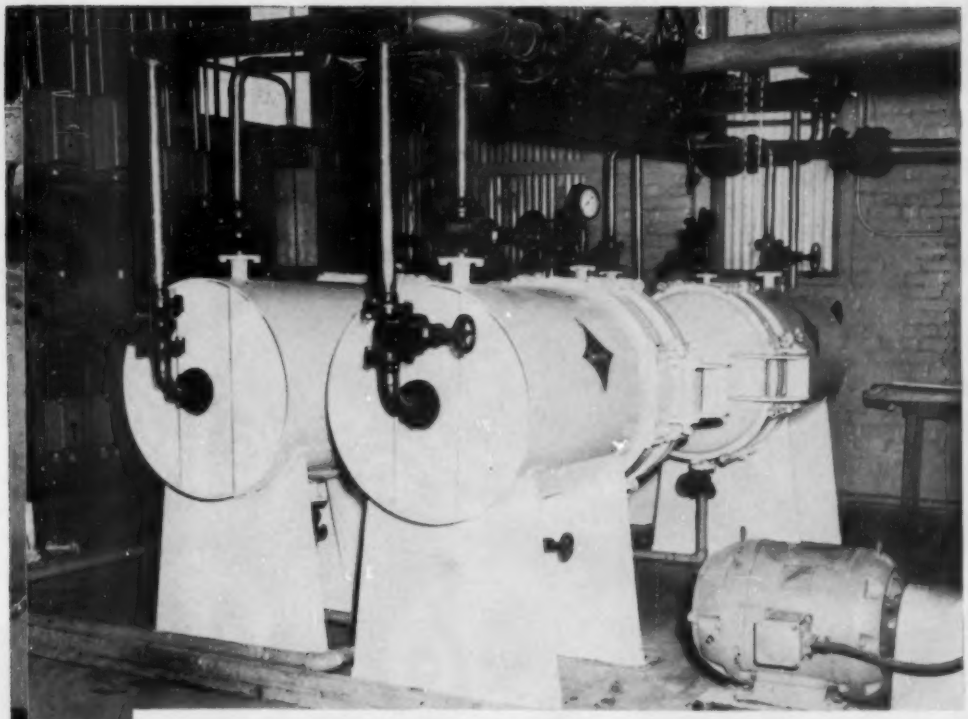
Wide range of filter types and specific engineering delivers efficient filtration for any process.

Automation tunes filter to peak efficiency at all steps in operating cycle

This Industrial filter is engineered to provide unusually complete control in filtering hot "thick" sugar liquor. The automatic controls can be set to carry out a complete cycle during which the filter fills, precoats, filters, drains, fills for shaking with a "thin" juice, shakes the filter cake off the leaves, drains off filter cake, sluices and starts to precoat again.

Automation All controls can be preset as desired to time each part of the cycle. The cleaning cycle can be started either by a timer or by a switch activated by pressure on filter cake. Variations in cycle can be obtained by simply adjusting dials and all automatic controls can be cut out for semi-automatic operation by toggle switches.

The process This filter is used to clarify sugar liquor in the second process stage. Here the sugar fluid has already gone thru one filtering operation and has been reduced by evaporation. The fluid is hot (about 150° F) and its viscosity permits a flow rate around 13.5 gallons per square foot per hour or 3000 gallons per hour for the filter. The sugar will go thru several more evaporation and filtering operations before it is ready for use as syrup or made into crystals.



Industrial's Tubular Filters. Each has 86 sq. ft. of filtering area. This type is ideal for polishing and actually costs less than scavenger or auxiliary equipment on larger filters.

Polishing sugar at 1¢ per 500 lbs.

Tubular Filters were recommended by Industrial's engineers for the final clarification of the sugar liquors because they can deliver the desired results at an extremely low cost and are an economical purchase. Operated two at a time, they process 27,000 lbs. in 15 minutes, and from 5 to 11 batches can be processed before cleaning. The low cost is due to the extremely convenient design. Filtrate flows from the inside to the outside of several perforated tubes in the chambers. Filtration is accomplished by filter papers inside the tubes. Cleaning is especially easy, the filter papers are simply taken out and replaced with clean papers.

These sugar plant installations point up the reasons why Industrial is your best choice for any filtration job.

- **Industrial provides advanced engineering for specific applications.**
- **Industrial's standard units bring to your plant the fastest, most convenient and efficient filtration available today.**

SELECTION OF FILTER IS IMPORTANT

Here . . . Industrial offers you a vital service that assures you of the finest filtration system available. Industrial produces all types of filters . . . Horizontal, Vertical Leaf, Tubular, Hydra Shoc . . . and recommends, *without partiality, a filter most suitable to your particular requirements.* Industrial's accumulated engineering and manufacturing experience can be a great aid to economical processing. Many cost-saving optional features are available and almost all Industrial Filters are adaptable to complete automation. Intelligently selected, soundly engineered filters can pay for themselves in a surprisingly short time.

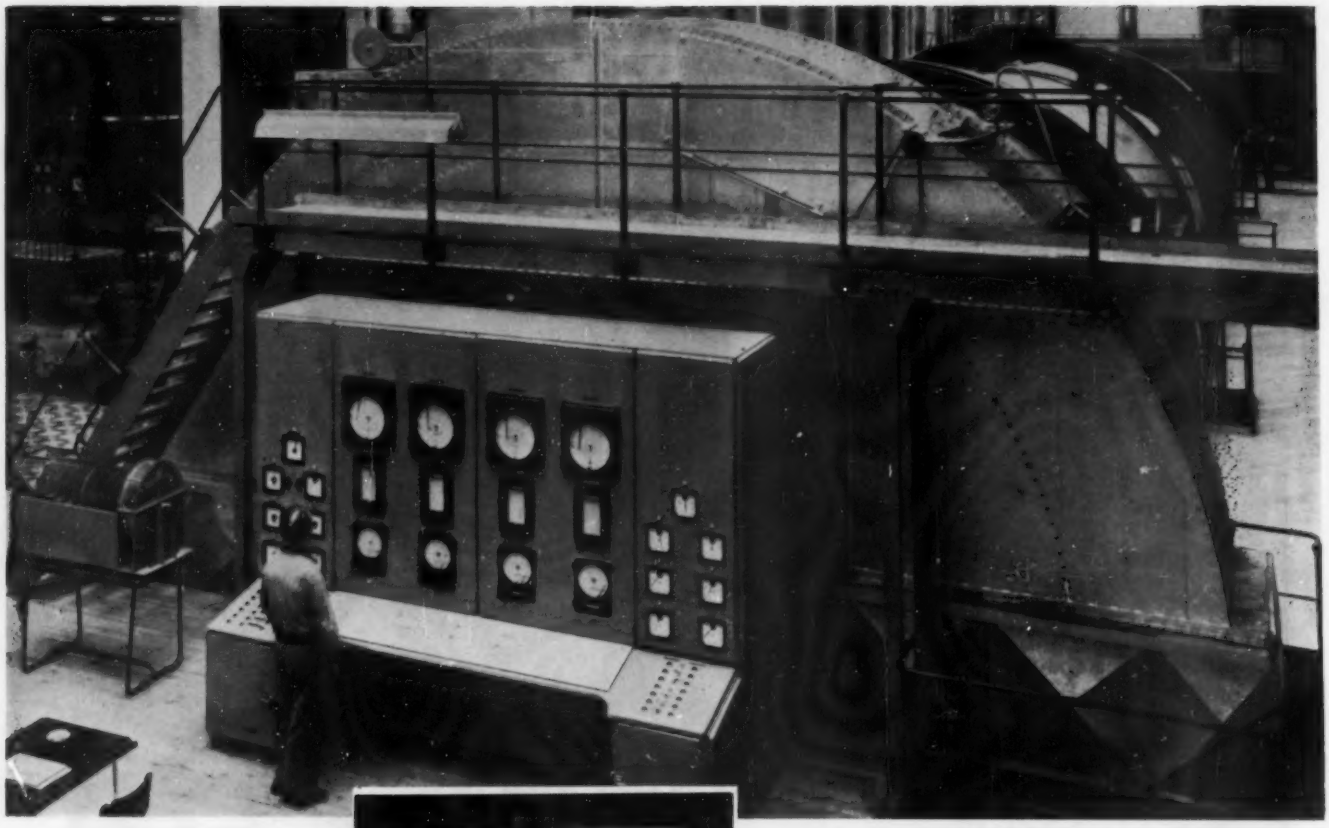
WRITE FOR DETAILS

Reprints of "Automation," an article from Sugar Magazine about a typical sugar installation, are available as well as folders describing all Industrial Filters, Vertical, Horizontal, Tubular and Hydra-Shoc.

INDUSTRIAL

FILTER & PUMP MFG. COMPANY

5928 OGDEN AVENUE • CHICAGO 50, ILL.



R.T. Continuous Diffuser with capacity of 3000 tons of beets per day.

R.T. CONTINUOUS DIFFUSER

The only diffuser which includes all the following advantages:

1 Ideal flexibility of operation, with perfect regularity of results; a temporary shutdown, even a long one, has no undesirable effects.

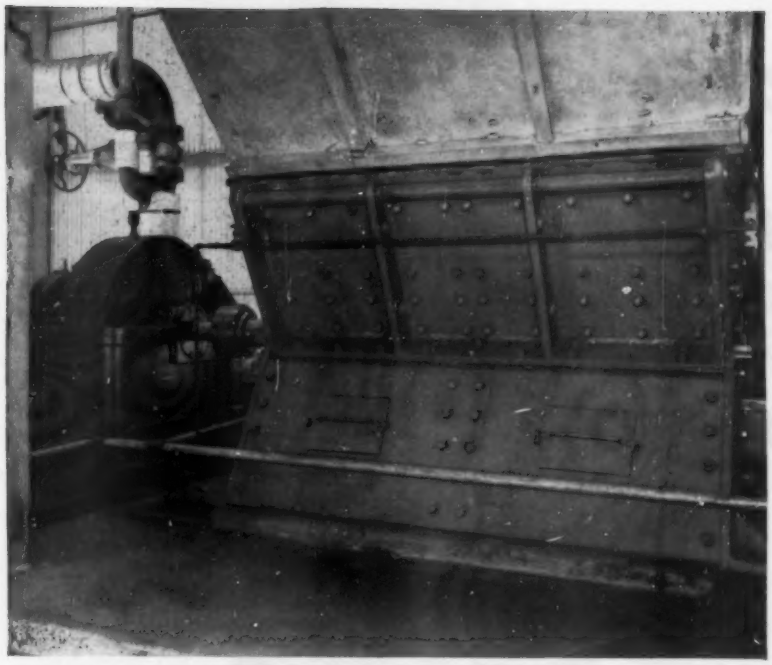
2 Perfectly controlled counter-current throughput of juice and cossettes; there is no channeling, nor stagnant zones.

3 Retention time of the juice is only half as long as that of the cossettes; there are no undetermined losses during the time needed for thorough extraction of the sugar.

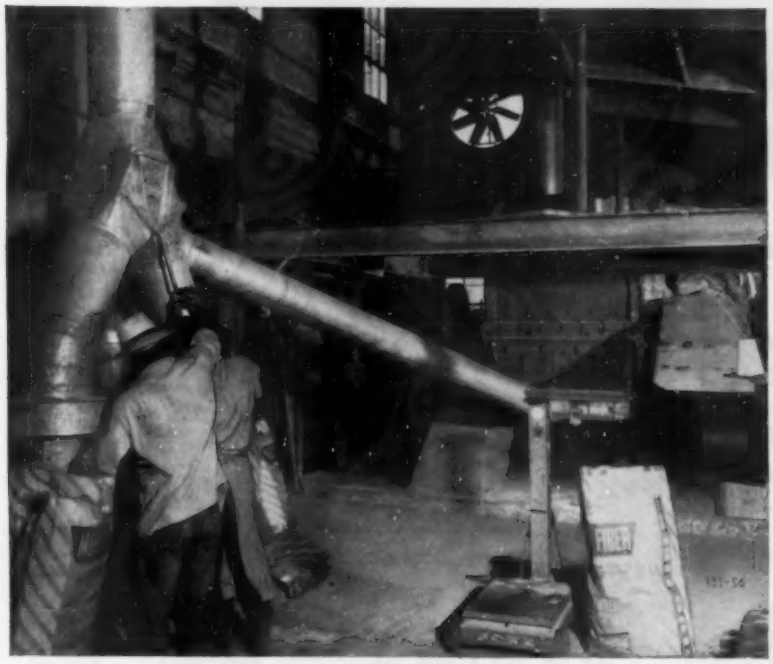
4 Losses of sugar in pulp, with equal juice drafts, are the least.

5 The internal structure of the diffuser comprises no moving mechanical parts.

Societe Sucriere D'Etudes et de Construction



Jeffrey 42" x 72" cane shredder.



Jeffrey 42" x 54" bagasse shredder.

Save time and increase yields with

JEFFREY SHREDDERS

● Jeffrey shredders efficiently break down juice-bearing cane cells. Then you get more complete sucrose extraction under the pressing action of milling rolls. Your milling efficiency can be increased and your plant capacity expanded with Jeffrey shredders.

Jeffrey shredders are built for either large capacities or for moderate requirements. On both models, frames are designed to avoid objectionable build-up of damp, sticky cane.

and for shredding bagasse

Once disposed of as waste, bagasse is now being reduced in Jeffrey shredders to a fine, fibrous pulp and converted into paper and paperboard products. Find out more about how Jeffrey shredders are playing a part in the development of these important new materials!

Export Division
THE JEFFREY MANUFACTURING COMPANY
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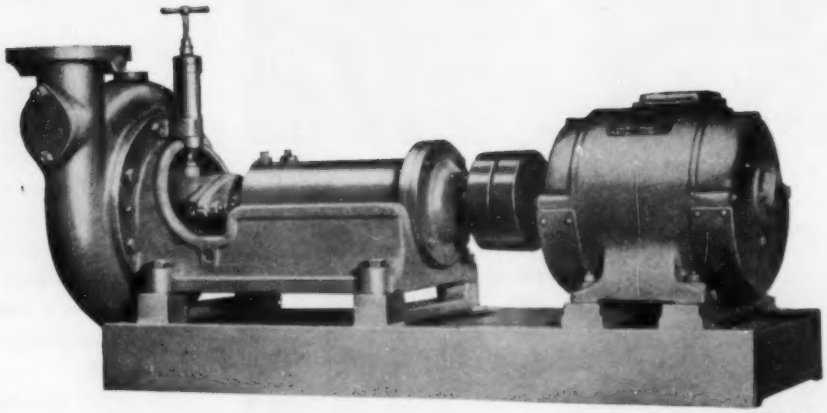
JEFFREY

Why strain Return Juice?

Leading Sugar Makers throughout the World

don't do it!



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Cane, beet or corn, the sugar you make can be refined to highest standards of quality at minimum cost, when you use DARCO activated carbon.

WANT PURITY? DARCO's high adsorptive power assures thorough removal of colors, odors, and other impurities. DARCO is highly pure itself, too . . . won't introduce contaminants.

WANT EFFICIENCY? The DARCO process requires minimum labor or equipment. DARCO has high bulk density; gives long filter cycles.

WANT HIGH YIELDS? DARCO takes out colloids that interfere with crystallization, and assures maximum sugar in the bag.

WANT ECONOMY? You'll save time, labor, steam and carbon by using DARCO. It's the choice of leading refiners everywhere.

Write to Atlas today for data on the DARCO process, and for recommendations on how it can be applied in your refining operations.

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pHact or fantasy?

ALADDIN HAD A GENIE . . . . . pH HAS GENIUS

"We can't all have a genie," we informed Aladdin, "but we've got pH and that's sheer genius."

For pH is responsible for most of the good things conjured up by the genie. And it doesn't matter if you're electroplating lamps or producing cloth to polish them . . . there's a *correct* pH value for each process that alone assures success. In these and most other chemical processes it is particular pH values that decide the quality of the finished product. To prevent waste of both materials and reagents, pH must be determined and corrected *accurately* . . . In this respect Pye pH is worth a generation of genii.

Are you in a pHog about pH?

Perhaps not! But we *would* like you to write for our illustrated booklet entitled "A Happy Solution". It shows how various industries are using pH to better their products and describes the appropriate Pye pH meters and electrode assemblies.

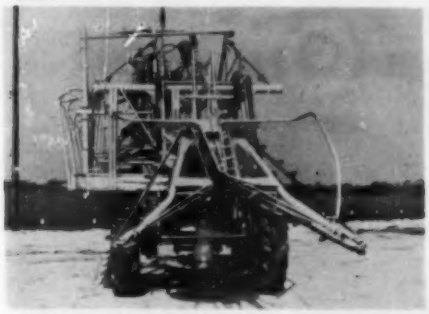
SCIENTIFIC PYE INSTRUMENTS

W. G. PYE & CO. LTD., GRANTA WORKS CAMBRIDGE

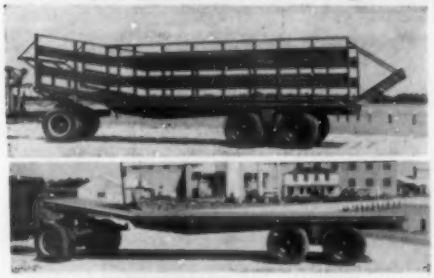
Mechanized Moneysavers

J & L equipment is your key to greater profits—easier handling

CANE CART 3 to 7 ton capacity carts available . . . chassis is constructed of a 5" structural channel outer frame. Rugged construction and flexibility provides for towing several carts in a single train.



CANE HARVESTER The J & L Harvester Unit is an attachment, hydraulically controlled, that can be mounted on most popular cane tractors. It is inexpensive enough to pay for itself in a single season. Quickly detached after harvesting.



CANE UTILITY TRAILER • Removable Sides • For Year Round Utility Hauling
Lowest Possible Cubage • For Export Packaging
Rugged Construction • To Withstand Sugar Cane Field Conditions
High Tonnage Capacity • Reduces Hauling Cost

CANE LOADER Mechanical cane loading can save you many times the initial investment. J & L cane loaders are simple, ruggedly constructed and adaptable to conditions in cane fields anywhere in the world.

J & L Engineering is available to serve the sugar industry with a complete line of harvesting equipment designed for simplicity, low maintenance cost with LOW INITIAL COST.

LOW MAINTENANCE COSTS because of simple power system. MAXIMUM INTERCHANGEABILITY of gears bearings, and oil seals. MAXIMUM STRENGTH in every part and facing, in anticipation of hard knocks and unfavorable field conditions.

LOW INVESTMENT—Buy the harvester unit only, your tractor furnishes motive power. Detach tractor for plowing, furrowing, fertilizing, planting. Attach tractor for harvesting. Entire attach-detach cycle is only 16 man hours on most all tractors.

MAKE LOADING EASY—Piling arm reaches 4 rows. This long reach, combined with selective discharge system, means you can pile as many as 8 rows on the heap row . . . and keep the heap row orderly!

EASY OPERATION—Your operator learns the J & L Harvester in two to three hours. After five hours he is completely trained. These are true average learning times, as reported by users, and timed by our engineers in the field.

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make

HIGH PRODUCTION

easier!

PART OF THE NEW BATTERY OF BROADBENT CENTRIFUGALS AT SEZELA DURBAN

the most successful sugar factory centrifugal in the world

The new BROADBENT 'FUGALS are constantly breaking output records, and are proving exceptionally reliable under diverse sugar factory conditions because of their simple basic construction and sound manufacture.

The labour saving finger tip operation and automatic process control combine to give rapid economical production of uniform high quality sugar.

Write for Publication No. S/5507/2500.

Represented in all sugar producing areas

THOMAS BROADBENT & SONS LTD.

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CABLES: BROADBENT, HUDDERSFIELD
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THE ACE YOU NEED TO SAVE YOUR STAKE...

When sugar beets are the stakes and weather is the dealer, you've got to ante with the right equipment. A Silver Thinner working every acre gives you the last ace.

Experience keeps on building up to show that you can deal yourself a sure winner in machine thinning—Silver Thinners. They provide the best stand for fast growth and heavy production, freedom from weediness, and in-the-row crust breaking. These thinners are used and accepted throughout the U. S. and Canada.

EVERY beet territory needs thinning by Silver. Eleven models to suit acreage and planting practice variations. Write for complete literature and prices.

SILVER ENGINEERING WORKS, INC.

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first developed by Refined Syrups and Sugars, Inc., is now fast replacing granulated throughout the food process industry.

In sugar refining color removal is of prime importance. Refined Syrups & Sugars, Inc., have used SUCHAR activated carbon for this purpose for over 30 years.

SUCHAR can remove up to 10% more color than ordinary purifying agents. Furthermore, you use *less* SUCHAR to get these superior results!

A fair comparison trial of SUCHAR with the agent you are using now is the best way to prove for yourself the economy and efficiency of this outstanding purifier.

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...you can do it better with Activated Carbon

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SUGAR

JANUARY, 1957

Despite Controls and Adverse Prices

World Sugar Use Mounts Steadily

By Albert Viton

World use of centrifugal sugar has risen more during the past eight years than during the two scores of years preceding World War II. In 1956, each person outside of China used 41 lbs. of sugar (raw value), which was 32 percent (10 lbs.) more than in 1934-38. World consumption (exclusive of China) reached 39.2 million metric tons (43.1 short tons), or almost two-thirds more (67 percent) than in 1934-38, when total world usage amounted to 23.5 million tons. Total consumption of non-centrifugal sugar is about the same as in pre-war years, which means, of course, a decline per capita. But the decline is negligible in comparison with the rise in white sugar consumption. Indeed, during the past ten years consumption of sugar rose more steeply than of any other major food.

Contrary to most forecasts, furthermore, the rate of consumption growth has not slowed. Since 1949, when the average 1934-38 usage of sugar per head was regained after the decline of the war years, consumption has expanded by an average of 3.3 percent a year. In 1954, consumption was about 4 percent higher than in the previous year, and in 1955 it was 3.0 percent above 1954. The rise in 1956 was probably close to 3.3 percent. In contrast, the average annual rate of growth during 1920-39 was 1.5 percent.

Of course the rate of growth has not been the same in all continents and in all countries. It is important to look at the picture more closely. Immediately after the war, the greatest increase was achieved by Latin American countries. Economic prosperity as a result of higher export prices and rising production made possible a rise of almost 50 percent in the per capita sugar consumption by 1949. In other continents at the same time, per capita supplies were still 5-20 percent below pre-war. Since then, however, the rate of growth in Latin America has considerably slowed. In 1955, consumption was only 15-20 percent higher than in 1949. Important to observe is that in the ten years 1946-54 Latin America became a high sugar consumer for the first time in its history. The average per capita consumption of 63 lbs. in 1955 (before the war: 37 lbs.) is substantially higher than the 1934-38 Western European average (55 lbs.).

Since 1949, it has been the Near East, Africa and Asia that have scored the greatest percentage consumption increases. Until then, Asia's consumption was about 20 percent below 1934-38, while the other areas had achieved only small increases. But since the beginning of this decade Near Eastern and African countries have increased per capita consumption by about 50 percent. As compared with pre-war, each person in this vast region consumed in 1956 more than twice as much sugar. Total consumption increased, of course, even more—by 190 percent. Nor is the end of the period of growth in sight. On the contrary, barring a world economic collapse, consumption will continue to grow rapidly. Instead of consuming three million tons (1.1 million in 1934-38), this region will soon absorb 4.5 to 5 million tons, if supplies are available at the 1955-56 prices.

Percentagewise, Asia's rate of growth since 1951 has been among the highest in the world. But it should be observed that Asia started from a very low base. Due to wartime destruction and post-war dislocations, even in 1951 Asia's per capita consumption was only 90 percent of prewar, when the rest of the world had substantially surpassed the pre-war level. Since then, however, Asian consumption has risen by 50 percent. All indications point to the conclusion that considerable growth is to be anticipated in the future. Many countries are undertaking new and greater economic development programs to raise standards of living, and these are bound to stimulate further increases in demand for white sugar.

That a rise in income in these poor, underdeveloped countries, which have had the lowest standards of food and sugar consumption, would be reflected in a rise in sugar consumption can be logically anticipated. But the significant thing is that in low income countries a rise in income seems to have a greater effect on the consumption of sugar than of other advanced foods, such as dairy products, meat, etc. This is a point which deserves careful consideration by governments and food industrialists. And while at present 90-95 percent of the sugar is consumed directly in the households, the prospects are that as countries pass the 50-60 lb. mark (person per year), there will be a steady rise in the percentage consumed through manufactured products—confectionery, soft drinks, ice cream, canned, and preserved fruits, bakery products, etc.

On the other end of the income-consumption scale stand North America and Oceania. In these areas, which have had the highest consumption in the world, there has been no marked increase in per capita usage, although income has risen substantially and the "real" price of sugar relative to other foods—and of course relative to income—has declined. I submit that empirical evidence seems to justify the conclusion that there is an upper limit to the amount of sugar human beings will consume in one form or another. This upper limit I would put in the range of

TABLE 1. WORLD CONSUMPTION OF CENTRIFUGAL SUGAR
(in millions of metric tons, raw value)

Region	Pre-War	1951	1954	1955 (prel.)	1956 (est.)
Western Europe	6.9	8.0	8.8	9.3	9.7
North America	6.5	7.7	8.2	8.4	8.6
Central America	0.6	1.3	1.4	1.5	1.6
South America	1.4	3.0	3.5	3.6	3.8
Near East	0.3	0.6	0.8	0.8	0.9
Asia*	2.9	3.2	4.8	5.0	5.3
Africa	0.8	1.7	2.1	2.2	2.3
Oceania	0.5	0.6	0.6	0.7	0.7
Total	19.9	26.1	30.2	31.5	32.9
Eastern Europe, U.S.S.R. and China	4.4	4.4	6.2	6.5	6.9
World Total	24.3	30.5	36.4	38.0	39.8

*Excluding China.

TABLE 2. POUNDS PER CAPITA CONSUMPTION OF CENTRIFUGAL SUGAR

Region	Pre-War	1951	1954	1955	1956
Western Europe	55.4	57.9	62.7	65.1	67.5
North America	101.9	100.1	102.3	103.4	103.4
Central America	36.5	54.3	56.3	58.7	60.5
South America	37.2	57.9	62.0	64.9	65.6
Near East	13.0	20.9	24.6	27.1	29.5
Asia*	9.9	9.2	13.4	13.6	14.3
Africa	11.7	19.1	21.8	22.9	23.8
Oceania	99.	113.7	103.8	104.1	105.6
Average	31.5	34.5	38.1	39.2	40.5

*Excluding China.

100-125 lbs. per person, depending on taste, social organization, dietary and cultural patterns, etc. In the United States, the crude figures show that consumption has stabilized at around 104 lbs. But the crude figures are somewhat misleading, as the high birth rate in recent years has greatly increased the percentage of children below 12 years of age who normally consume less sugar than adults. Adult consumption has risen, but not by very much. Nor should a significant increase be expected in the future, unless there is a reversal in present thinking—and fashion—on nutrition.

Europe stands between the low income-consumption countries, on the one side, and North America-Oceania, on the other. Before the war, per capita consumption in Western Europe was around 55 lbs. per person—as compared with 100 in U. S.-Oceania and less than 20 in the rest of the world. But during the war supplies of sugar, as of other foods, declined; and even as late as 1949, European consumption was 5-10 percent below pre-war. A few years ago I read a long study of consumption in Europe which came to the conclusion that future increases would be small and would be confined entirely to the southern part of the continent. However, events do not always follow the "laws" and conclusions laid down even by the most learned of us. By 1955, average Western European consumption had risen by almost a fifth (17 percent) over the pre-war average. Total consumption had increased by 35 percent, having risen from 6.9 to 9.3 million tons. Although Western Europe's share in total world consumption has diminished steadily since the beginning of this century, it still consumes one-quarter of the world's centrifugal sugar. (North America consumes 22 percent; Eastern Europe about 15 percent; between them, these areas, with 30 percent of the world population, account for almost two-thirds of the world consumption.)

As to the U.S.S.R. and Eastern Europe, published statistics indicate that per capita consumption has risen from an average of 28 lbs. before the war to 42 in 1955, or an increase of 50 percent. Total consumption is supposed to have risen from 3.7 to 6.0 million tons. However, our knowledge of conditions in Eastern European countries leaves much to be desired. I am convinced that the published statistics greatly exaggerate the extent of consumption growth that has taken place.

To return to Western Europe, as might be expected it has been in the countries of the southern part of the continent—which had the lowest income and lowest per capita consumption before the war—that the greatest increase has taken place. The fact is that, although these countries have wine, large varieties of fresh fruits, and plenty of sunshine, consumption has risen not in relation to any decrease in supplies of wine or fresh fruits or sunshine, but in relation to the rise in real income and in relation to changes in sugar prices (absolute and relative to other foods). An excellent illustration of the way sugar consumption responds to changed economic conditions is provided by Italy. That country has enjoyed a very high degree of prosperity during the past few years—which is reflected in the 112 percent rise in per capita consumption. It has risen from 17.5 lbs. in 1934-38 to 37.5 lbs. in 1955, and will probably reach 40 lbs. in 1956. Significantly, the greatest rise within Italy appears to have taken place in the southern part, which was the poorest, most neglected part of the country, and had the lowest sugar consumption, before 1939. Consumption has increased significantly also in Portugal (50 percent) and Yugoslavia (100 percent). In Greece and Spain, for reasons which are not too obscure, pre-war consumption was regained only in 1954-55. In 1949, Greece's per capita consumption was only 82 percent of pre-war, while in Spain it was barely more than half of the 1934-38 average.

As to the countries which even before the war used 100 to 120 lbs. of sugar per person (Denmark, Sweden and the United Kingdom), there have been practically no changes. In the U. K. there has been a slight increase—significantly, almost entirely in the form of manufactured products and in catering establishments. In most of the remaining European countries the pre-war per capita consumption was 60-65 lbs.; and in these there have been increases from 15-30 percent, mostly since 1950. These increases are larger than probably would have been predicted a few years ago.

In general the more industrialized and the more urbanized the country the higher will be the percentage consumed through manufactured products, as against direct consumption in the household. Again, the higher the total sugar consumption the greater will be the percentage consumed in the form of manufactured products. Or, to put it in a different way, the higher the per capita income and standard of living the greater will be the percentage of sugar that will be consumed through manufactured products. But there are exceptions to these generalizations, and an analysis of the reasons for, and explanations of the various national consumption patterns would involve us—in so far as they can be explained—in a complicated study of customs, social and family organizations and patterns, food tastes, etc. Here, we can only glance—and very briefly—at the bare facts.

How are the differences in consumption growth during the past decade to be explained? In 1951 and in 1955 and 1956: Why has consumption increased by an average of 900 percent in Belgian Congo, Haiti, Angola and French Equatorial Africa, why only by an average of 10 percent in Thailand, Ceylon, Portugal and Spain?

A complete answer would involve analysis of social organizations, levels of agricultural and technological advancement, cultural traditions, food patterns, as well as economic factors. Now, however, I shall deal only with the economic forces and influences. I believe that it is possible to demonstrate a definite and very high correlation between consumption and the "real" price of sugar. The lower the "real" cost—that is, in terms of other foods and in terms of income—the higher the consumption.

Furthermore, the effects of a given percentage change in price or income varies in relation to the levels of both. In other words, the lower the income, the greater will be the effects on consumption of a decrease in price or an increase in income, and vice versa. Again, the higher the price, the greater will be the effects on consumption of a decrease in price or an increase in income. However, the effects of economic changes are not identical among all countries of the same income or price status. Each country, or at least group of countries of similar cultural, economic and social forms, has to be examined separately to determine the laws governing the relationship between consumption and price-income. However, for the world as a whole a 10 percent rise in income has been associated with a 5 percent rise in sugar consumption, while a 10 percent decline in price has been associated with a 4 percent rise in consumption.

The largest share of the consumption rise must be attributed to the great expansion in income which has occurred since the end of World War II, particularly in the traditionally backward and poor countries of Latin America, the Near East and Africa. Higher prices for their export commodities, whether metals and minerals or agricultural goods, the influx of foreign capital for investment, planned industrial and other development programs—all these in combination have raised per capita income in many of these countries by 50 percent or more during the past few years. In Asia, on the other side, post-war political and economic dislocations prevented economic growth. Indeed, during many years Asia experienced a fall in economic activity and income—and with it a fall in sugar consumption. The turning point was not reached until 2-3 years

ago—and in some countries has not yet been reached.

As to price, differences between countries are, strange to say, almost as great as differences in consumption standards. Of the 102 countries for which I have collected detailed data on retail prices, 19 had in 1954 prices of less than 7 U. S. cents a lb., and in 35 the retail price was between 7 and 10 U. S. cents. On the other side, in 33 countries, the retail price was between 10 and 15 cents, while in 18 a lb. of sugar costs more than 15 cents. In some countries a lb. of sugar costs as high as 25 U. S. cents. In short, half of the countries had retail prices below 10 cents a lb., and in 50 percent prices were higher.

Many factors explain these differences in retail prices: protection of high cost domestic producers; taxation to raise revenue; various types of local and special purposes taxes; a policy to discourage consumption, etc., etc. Of course, sugar is not the only agricultural and industrial commodity that is protected; but I believe that there is no other food of everyday consumption which is subject to so much controls, regulation, administration, and political and social pressures. Of the 130 countries the sugar regimes of which I have examined, not more than 10 percent, at the maximum, can be said to have sugar economies which are free from controls and substantial fiscal imposts. In some countries, duties and other taxes account for 35-50 percent of the retail price.

The variations in domestic prices go a long way to explain differences in consumption, whether in the household or in the form of manufactured products. The money price is of course only part of the story. The same money price has one meaning in a country where it represents 20 percent of a person's average daily income, and it has a totally different meaning in another country where it represents 2 percent. Unfortunately, it is true to say that in general even current money prices of sugar are higher in low income countries than in the highest income countries. In "real" terms, however, the price differences are enormous.

One excellent measure of the "real" cost of sugar is the quantity that can be bought with the average income. Such an analysis shows that the average person in the U. S. can buy with his income (at the local price) about twenty times more sugar than the average person in the Dominican Republic, Haiti, Nicaragua, Ecuador and Paraguay, and 20-30 times more than in most Asian countries—16,700 lbs. of sugar as compared with 900-1300 in the Latin American countries and 450-900 in most Asian countries. In terms of income, sugar is cheaper in the U. S. by 15 to 20 times than in the first group of countries, and by 20-30 times than in the second.

Denmark, Norway, Sweden, Switzerland and the U. K. have per capita incomes in terms of sugar of 8,800-12,100 lbs. per annum. To put it another way; sugar is 25-50 percent more expensive there than in the U. S. Belgium, France, Ireland and the Netherlands belong to the middle group of 4,400-8,000 lbs. Germany, Austria and Finland stand in a category by themselves of around 3,500-4,000 lbs. In the remaining countries, the cost of sugar was so high in terms of income that only 1,320-2,200 lbs. could be purchased with a year's average income. Using the first group of European countries as a yardstick, we can say that the "real" cost of sugar in the lowest income countries is five to seven times higher.

But the trend of prices is downward. Not only of "real" prices, but even of current money prices. Many countries have found it possible to reduce prices during the past 4-5 years, notwithstanding the rise in wages and cost of other materials. As to real prices—in terms of income or in terms of other goods and services—and that is of course the important thing—the decline since 1938 is very noticeable. In Europe, the deflated price was higher than in 1934-38 in six countries and lower in at least 10. In terms of wages, the current situation is more favorable still.

All this leads me to the conclusion that the outlook for future consumption growth is very favorable. Notwithstanding the rather sad fate of most prophets, I will venture the following statement: assuming continuation of current trends in employment and income, sugar consumption is likely to continue to grow by 2.0 to 2.5 percent a year. Of this, about 1.2 percent is to be attributed to population growth, and the balance to the income and price trends which seem to be currently in operation. In other words, excluding major political, economic or military upheavals, consumption of centrifugal sugar (outside the U.S.S.R., China and the Eastern European countries) is likely to increase from 31.5 million metric tons (raw value) in 1955 to close to 40 million tons by 1965. A measure of the magnitude of the change that is taking place before our eyes is provided by this comparison: during the 20 years between the two world wars consumption in this area rose by about 4.5 million tons, while during the 20 years after World War II consumption is likely to rise by 20 million tons.

Report on the Fiji Sugar Industry

Research Campaign in the Pacific

Fiji has an available market for 204,000 short tons of sugar. However, in 1955 they had their second highest yearly output and produced only 180,000 short tons.

Early prospects for 1956 were for 198,000 short tons. This was upset by cyclonic storms, starting in January, which poured over 100 inches of rain (more than double the average) in the main cane areas during the first quarter of the year. In many sections, the crops were submerged so long that severe losses resulted in an estimated production for this year of only 163,000 short tons.

The Colonial Sugar Refining Company, Ltd., founded in Australia in 1855, started sugar operations in Fiji in 1880. This was only six years after the Islands had been accepted as a Colony of the British Crown. There were earlier efforts to start commercial sugar production, but all failed.

Today C. S. R. owns the five mills in the Colony. Four are located on the larger Viti Levu Island; one on Vanua Levu. Lautoka Mill has a capacity of some 99,000 short tons of sugar per year and is one of the largest raw factories in the Southern Hemisphere.

When Indian migration to Fiji came to an end in 1916, the Colonial Sugar Refining Co. split up its large plantations and leased the land to individual tenants in blocks of 10 to 12 acres at low rentals. The company retained some 3 percent of the area, mainly for experimental and training activities.

Today, C. S. R. continues to finance some of the farmers and maintains a staff of skilled field people to work closely with the growers. Advice and guidance are provided on methods of cultivation, drainage, new cane varieties, harvesting schedules, etc. As a result of the change from the plantation to the independent grower system, Fiji now has some 12,000 cane farmers cultivating about 110,000 acres.

Cane tonnage in the Islands is relatively light—running from 23 to 28 tons per acre. Some 85 percent of the cane is harvested without burning. It takes about 7½ tons of cane to make a ton of sugar. One ratoon crop is normal. However, as growers are getting out of the noble canes and planting C. S. R. developed hybrid varieties, an increased number of ratoons are expected in the future.

It might be possible to expand present production of cane in Fiji by some 25 percent in undeveloped areas. However, no steps are underway at this time to do so.

Temperature on the dry side of Fiji ranges from 54 degrees to 96 degrees. Average rainfall on the dry side is about 75 inches per year, and on the wet side, 120

D. R. Strong, technical field officer, and Nigel Montieth, agriculturist of the Colonial Sugar Refining Co., examine the Fiji disease plot.

inches. Irrigation is not used in the fields.

There is little mechanization on the Fijian farms. A few tractors are used in cultivation, but this is accomplished largely by animal power.

Most cane transport is provided by C. S. R. with its own tram lines. Trucks carry no more than 15 percent of the crop. Much of the cane is hauled great distances. The longest haul is 81 miles. This must be some kind of a record in the sugar industry.

The company has 400 miles of permanent light railway tracks on the Islands, and 160 miles of portable track. Fifty-seven locomotives are used to pull 6,400 cane cars. In addition, C. S. R. uses 64 cane punts (barges), each loading 50 tons; 15 sugar lighters; 10 molasses barges, and 13 steam and diesel launches.

The government of Fiji depends on C. S. R. to assist in highway problems. Roads are usually routed over the cane tram bridges, rather than having highway bridges constructed. And, C. S. R. runs free passenger trains on its lines at scheduled times, providing the only means of transportation for many cane farmers and their families.

From earliest days, Colonial Sugar Refining Company has encouraged Fijians to take part in the sugar industry. Since 1938, they have run a special training farm for Fijian boys on 400 acres of their best land at Drasa, near Lautoka. The boys are trained in cane growing and all aspects of its cultivation, dairy farming, the care of animals, and the growing of native food crops. The company bears the entire expense for a three-year program. The Fiji government cooperates in the selection of boys for training, and assists them in placement on suitable land after they finish their course.

Sugar is by far the most important industry in Fiji. In all, some 40,000 people depend upon this crop for their livelihood. C. S. R. is also in the cattle business in Fiji with some 3,000 head. Their dairy cattle contribute greatly to the fresh milk supply on the Islands.

For several years a research project has been conducted jointly by the Colonial Sugar Refining Co. and the Hawaiian Sugar Planters' Association Experiment Station, at Lautoka, Fiji. The study is devoted to work on Fiji disease and Downey Mildew. Both diseases are found in Fiji. Neither has yet reached Hawaii. Among other studies, the susceptibility of standard Hawaiian canes to these diseases is being investigated.

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Typical Fijian house, located at the Colonial's training farm at Drasa.

Advertising Display at Crockett

The largest illuminated advertising display erected in 1956 in Northern California was placed in service late in November on the Crockett plant of the California and Hawaiian Sugar Refining Corporation. The display is 180 feet wide, 50 feet tall, and spells out the words—C and H Pure Cane Sugar—in multi-colored sequence to identify the world's largest cane sugar refinery.

The display was placed in service by Donald Maclean, C and H president. At a brief ceremony held on the roof of the sugar refinery, Mr. Maclean said: "The letters of the C and H trademark have served for fifty years as a symbol of sugar grown in Hawaii and refined in California. C and H was our trademark when we began refining Hawaiian raw sugar here in 1906. It is our trademark in 1956. As our fiftieth anniversary year draws to a close and we enter our second half-century, it is a pleasure to place in service this attractive display which symbolizes the desire and determination of the C and H organization and the entire Hawaiian sugar industry to continue to serve sugar consumers and food industries in the 36 mainland states, Alaska, and Hawaii where C and H sugar is sold."

New C. and H. display on Crockett refinery.

Market Changes During the Past Decade

SUGAR—from Cocoon to Butterfly

By William D. Lamborn
Lamborn & Company, Inc.

THE past decade has provided a golden opportunity to any young man in the sugar business, because it has shown, in the brief space of 10 years, how the marketing patterns of a large industry are formed—practically from scratch. In the past 10 years, the sugar industry in the United States has grown from a cocoon-like state of suspended animation, under complete government control, into a full-blown industrial butterfly with its own unique distributive pattern in an atmosphere of nearly complete economic freedom.

I say, "nearly", because we still operate under the provisions of the Sugar Act, which controls the availability of sugar from the various favored producing areas. Nevertheless, the difference between the war program's stringent regulations and today's relative freedom is vast.

Let us examine roughly the sugar marketing picture as it existed in 1947 under government control. In the first place, the United States Government, that year, purchased the entire Cuban raw sugar crop, as it had been doing during the war years. Second, the price at which *all* raw sugars were sold, whether government-owned or not, was fixed by the government. The rate paid for ocean freight to move raw sugars was fixed.

Raw sugars were allocated to refiners on a cargo-by-cargo basis in such quantities, and according to such a schedule, as the Federal Government might think fit.

The prices at which refined sugar was sold were also regulated—prices of primary distributors as well as wholesalers.

Moreover, refiners and processors were assigned geographical zones in which to distribute their products, and none could choose his own selling territory.

And, of course, we also had rationing of the finished product which was controlled at the manufacturer level and at the consumer level. Moreover, distributors, such as wholesale grocers and chain stores, were controlled as to the amount of stock which they could have on hand at any given time, which amounted to a form of rationing at the distributive level.

All in all, it can be said that the distribution of sugar in the United States during the wartime period was strictly regulated in every important category by Government.

Then, in about mid-1947, these controls were lifted, one by one, and refiners began

to purchase their first free raw sugars for 1948 delivery. The New York Coffee & Sugar Exchange opened for trading in sugar futures, and the industry as a whole was now ready to start from scratch to weave its own marketing and distribution patterns with the warp of supply and the weft of competition. The transition was striking!

One of the best indices of the changes which take place economically in an industry is price. I should like to quote, from Lamborn's Weekly Market Report of July 1, 1947, before freedom from bureaucracy, a summary of refined sugar prices, covering the entire continental United States.

"Ceiling price quotations remain unchanged. Domestic cane refiners quote 8.25¢ basis. Domestic beet processors carry an 8.15¢ basis quotation."

That was the whole story. We had, throughout the entire nation, a simple two-price system—government controlled.

Now let me read the comparable section of our Weekly Market Report of October 15, 1956, which covers the same product, sugar, in the same area, the continental United States.

"Refiners selling in the northeastern United States quote 8.85¢. In New England and the capital district of New York State, however, shipments at 8.75¢ will continue through October 19. Sucrest are shipping against October contracts at 8.70¢. They have accepted November contracts at 8.75¢. In southwestern Ohio, Gulf refiners list 8.65¢, but will ship at 8.55¢ until October 31, while eastern refiners quote 8.70¢.

"In the Southeast, refiners quote 8.65¢.

"In Gulf territory, refiners list their prices at 8.65¢ but will ship at 8.55¢ through October 31.

"In Chicago-west territory, refiners quote 8.60¢ less .20¢ except in Texas, Oklahoma and New Mexico, where the allowance is .10¢. However, they will ship at prices .10¢ below these figures through October 31. In Northern Indiana, refiners quote 8.70¢.

"In Pacific Coast territory, the cane basis is 8.75¢, but a .35¢ allowance is in effect in the state of Utah; in California, Arizona and in Reno and Las Vegas, Nevada, a .20¢ allowance applies, except that the withdrawal of this .20¢ allowance is scheduled for the close, October 19.

"Western beet processors quote 8.40¢ in Chicago-west territory with a .20¢ allowance applying except in Texas, Oklahoma, and New Mexico, where the allowance is .10¢. Until further notice, however, processors generally will ship at prices .10¢ lower than those quoted.

"In Pacific Coast territory, beet processors quote 8.65¢; but in Oregon, Washington, Idaho and Utah, day-to-day business is being conducted at 8.55¢; in Utah, a .35¢ allowance is in effect; in California, Arizona and in Reno and Las Vegas, Nevada, a .20¢ allowance applies, which is scheduled to be withdrawn at the close of business October 19. Michigan beet processors quote 8.45¢."

I think you will agree that the picture has undergone changes—a result of the impetus of competition, provided by a relatively free market.

But price is not the only category of change. Selling terms now vary widely throughout the nation from area to area.

The territories in which various sellers elect to market their sugars have also varied and continue to vary.

Sales policies are changed and different and are subject to further changes without notice.

All in all, it can be said that today's sugar market is as different from that prevailing ten years ago as salt pork is from sirloin.

The question might properly be asked, "Why, with a Sugar Act, designed to equate supply with demand, do we not end up with a more stable, uniform marketing pattern?"

There are, of course, many answers to that question, but most of them involve two broad categories: time and place.

As to *time*, even though the demand and supply for any entire calendar year may be equated for all practical purposes by the

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Based on remarks delivered before the Zerban Sugarmen's Luncheon Association, New York.

Sugar Act, nevertheless, there are *times* during the year when certain sellers, by reason of warehousing and/or financial problems, and by reason of their judgment of the market, are impelled to sell under pressure more than at other times.

With regard to *place*, every seller of sugar considers a certain territory to be his "natural" market, for reasons of favorable freight rates and so forth. Each such seller is bound and determined to do his utmost to achieve what he considers to be his rightful share of the business in what he considers his "natural" or favored market. When there are two or more sellers, contending for the same favored market and with different ideas as to each other's fair share of that market (and you can be sure that there will always be a difference of opinion), then prices and terms will vary according to the competitive pressures of the moment.

These favored markets, sought after by many sellers, tend to become "hot spots" in the sugar distributive picture.

It can be fairly said that, whenever several sellers meet in any one market which is too small to absorb their combined production, competition will result in such a way as to make that market different from any other.

And it can also be fairly said that, whereas the stability and tedium of a government-controlled, competition-free market may, because of its so-called "orderliness," appeal to some, it is the *free competitive* market which provides technological advances and favorable prices to consumers.

Let us examine some of the competitive hot spots, starting with California. California has become the largest producer of beet sugar in the United States. And since Californians like to excel in all categories, it is not surprising that their state also has the nation's largest sugar refinery.

Despite California's large population and the amount of manufacturing done there, too much sugar production cannot be swallowed up in the local favored market; hence the competition is hot and heavy and made especially so by the terrifically high freight absorption taken by California sellers when they ship east of the Rockies.

Another important hot spot is the territory served by the Gulf refiners. There are four Louisiana bone char refiners, another one at Sugar Land, Texas, plus three refiners using vegetable carbon and producing a limited assortment. All of these are vying for the nearby market which is low in density of population and relatively low in the manufacture of sugar-containing products. Here again, competition is exceedingly hot and heavy.

But perhaps the hottest spot of all is the area surrounding Chicago. I mentioned above that California cannot handle its entire sugar production at home. The residue cannot be sold immediately east or north because of heavy beet sugar production. Surplus California sugars must, therefore, leap-frog the Mountain states and land in Chicago.

The Gulf refiners, also unable to market all of their sugars in their home territory, roughly south of the Ohio, cannot move eastward because of the refining capacity and competition there. Hence they market some sugar in Chicago.

Rocky Mountain processors logically cannot ship to California or to the Central South. Chicago and surrounding points thus become an important market for them, hence they are also embroiled in the competitive battle there.

Even eastern refiners want their brands in this important city.

As an example of the heat of this competition, let us again use price as the index and refer back to the price summation given earlier. It shows cane selling in the East at 8.85¢ and in Chicago at 8.60¢ less .20¢, or 8.40¢—a difference of .45 cents per hundred weight for identical products. Beet sugar at Chicago was quoted at 8.40¢ less .20¢ or 8.20¢. Beet was, then, twenty points under cane at Chicago and a whopping 65 points under the price at which cane was selling in nearby Ohio.

In effect, the beet processors have said, "Chicago is ours." They have made their bid to dominate that market when they desire or need to.

And future years may see in Chicago an even hotter contest for sugar distribution, what with the latest amendments, passed last July, to the Sugar Act. They provide expanding quotas for the domestic beet industry, as United States sugar consumption increases. Since it is generally felt that consumption in the beet sugar producing areas will *not* increase apace with the quota increases, then it is expected that beet sugars will be even more constantly on offer in the Chicago area.

It is also held by many that this same quota situation will bring in its wake expanding movement of western beet sugars even further east than Chicago, because, after all, even the Chicago market has its saturation point as to the amount of sugar which it can absorb.

As a matter of fact, in the last few months of this year, western beet sugars have sold as far east as Rochester, Buffalo and Pittsburgh. True, the volume was modest, the assortment limited and the durations of these offers were short. But this is another example of the changing sugar scene in a free market.

Geographically, this now brings us to the Northeast and Southeast—two areas in which supply and demand are much more nearly equal than elsewhere. These areas are not the hot spots that the others are. Up until recently, the greatest economic thorn in the side of northeastern refiners was competition by offshore white sugars.

Today, offshore competition has been lessened to a great degree for three reasons.

First, the idea of handling sugar in liquid form has grown over the years, by leaps and bounds. It would be very difficult to tell you gentlemen of any carbonated beverage plant in the New York Metropolitan area which uses bagged sugar. Ten years ago, it would have been quite easy, and the bagged sugar would, in many cases, have been offshore refined.

Second, a similar development is rapidly taking place in the use of bulk dry sugar—again with many manufacturers who formerly used offshores.

Third, the complete transition in the grocery store to packaged sugar, away from the old-fashioned weighing out of sugar from 100-lb. bags by the grocer, has removed still another home for offshore refined sugar.

As a result, offshore sellers have tended to switch their interest from the Northeast to the Southeast where liquid and bulk handling have not developed as rapidly. But as a natural consequence, the spread of these methods is presently underway in the Southeast to meet the increased influx of offshores.

Thus out of the unanimity and relative stability which existed ten years ago as a result of complete government domination, we have now evolved five major sugar marketing areas: the Northeast, the Southeast, the Gulf territory, Chicago-west to Rocky Mountains territory, and the Pacific Coast. In addition, these territories are often divided by various buffer zones where prices, terms and the like tend to strike a median between two territories.

In looking forward to the future, it can be safely said, I think, that we are due for many more changes in sugar marketing. These changes will come about as a result of bringing liquid sugar to points where it is now not available. They will occur because of the increasing development of bulk handling of dry sugar. They will be forced as western beet processors expand farther eastward with a fuller assortment and on a more consistent basis.

And we must not overlook the possibility that important marketing changes may be brought about as new non-food uses are found for sugar through the work of the Sugar Research Foundation and other scientific organizations. The most obvious new use that occurs to me, as a marketing man, is the discovery that sugar can be used as the base for very wonderful detergents. If the vast detergent industry begins using sugar as the base of its products, the resulting changes in the sugar market will be nothing short of fabulous.

■

Personnel Change at Inland

The election of Frank E. Trager as vice-president of the Inland Sugar Company has been announced by Frank C. Staples, president of the American Molasses Company, of which Inland Sugar Company is a wholly owned subsidiary. Mr. Trager came with the American Molasses Company in 1946 as a salesman in the Package Division and has since served in various capacities, having been appointed general manager of the Chicago operations of the Company in 1950.

Improved Model of British Overloader

Efficient Handling of Raw Sugar

A NEW technique has been introduced into the operating procedure at the raw sugar warehouse of Hulett's S.A. Refineries Ltd., Port of Durban, Natal, South Africa. Until recently the bulk sugar stored in the refinery warehouse was recovered for processing by means of a cable operated drag scraper, with a crew of men consisting of the drag line operator and twelve workers for trimming the sugar to the line of the drag scraper. The output per hour by this method was 30 tons.

Now this cumbersome method has been replaced by a new Mark V Merton overloader, fitted with a 44 h.p. diesel engine and a ¾ cubic yard bucket, which requires the attention of only the operator and a single laborer. The machine is capable of discharging 3 to 4 buckets a minute, and refinery personnel state that it is delivering to the bulk hopper at the rate of over 60 tons per hour, an increase of over 100%, as well as providing a saving of 11 men.

The new overloader, manufactured by the Merton Engineering Co., Ltd., Feltham, England, features a number of improvements over its predecessor the Mark IV, introduced to the trade some three years ago. The bucket of the Mark V covers the full width of the front wheels of the tractor. This eliminates any tendency for the front wheels to ride up on the material being loaded and also increases the efficiency of the machine when excavating. The digging depth of the bucket can be adjusted by the removal and replacement of two bolts to any position between two inches above and four inches below ground level.

Old manner of handling raw sugar at the South African warehouse by means of a crew of thirteen men, and a drag line scraper.

The discharge height of the new overloader is variable. A small hand winch, operated by one man, raises and lowers the overhead structure of the machine by extending and retracting the telescopic rear upright members so that the bucket can be discharged at any height from the minimum of 6 ft. 11 in. to the maximum of 11 ft. 2 in. To change the minimum to maximum discharge height takes only three minutes and entails the removal and replacement of four bolts.

The reach of the bucket, i.e., the distance from the inside edge of the bucket when in the discharge position to the rearmost part of the tractor, is 3 ft. 5½ in. when in the minimum discharge position and 2 ft. in the maximum discharge position. From the minimum discharge position the overhead structure can be lowered still farther to the traveling position, giving the machine an overall height of 8 ft. 5 in., enabling it to pass under low obstructions.

The basic principles of the Mark IV are retained in the Mark V. The bucket is operated by winches and ropes. The winches are mounted above the rear wheels on either side of the driver's cab, and are controlled by one lever which operates both the winch drive clutch and the winch brakes. The drive to the winches is taken from the front of the engine and is, therefore, completely independent of the master clutch.

The overloader is driven into the stockpile with the bucket lowered. The bucket is then brought up with a crowding action and travels up the two overhead rails while the machine reverses to the conveyor hopper. It is then discharged over the rear of the machine and a pair of springs (previously compressed by the bucket on its upward travel) returns the bucket to the top of the rails to travel back to the digging position while the machine is going forward to the stockpile for the next cycle. The overloader need not turn or slew; it shuttles backwards and forwards in a straight line between stockpile and hopper.

The specifications include a Fordson 3,610-c.c. diesel engine; 11 in. dia. clutch; gearbox with six forward and two reverse speeds; semi-floating driving axle; and center-pivoted front axle; and recirculatory ball-type steering, giving a turning radius of 17 ft 6 in. Power for the winch drive is taken from the front of the engine crankshaft and transmitted through a Renold roller-chain.

The Merton overloader cutting into a mountain of raw sugar in the refinery's warehouse.

History of Michigan Sugar Company

Fifty Years of Achievement

THE year 1897 marked the birth of the beet sugar industry in Michigan. The spark which finally touched off an interest in such an industry was the enactment of a sugar bounty bill by the Michigan State Legislature, offering beet processors a bounty of one cent per pound for sugar produced in Michigan from local beets, provided that the purity of the product was at least 90 and that the farmers received at least $4.00 per ton for beets of 12% sugar.

Immediately, a virtual stampede began to build beet sugar factories throughout the Lower Peninsula of Michigan. Between 1898 and 1904 twenty-three factories were erected. Some of the factories failed. Even more would have gone under had not H. O. Havemeyer's powerful and experienced American Sugar Refining Company stepped in and lent a helping hand giving local companies technical and financial assistance so badly needed.

In 1906, Mr. Havemeyer promoted the idea of merging six of the local companies, in which American Sugar Refining Company had a stock interest, into one single company. This was achieved, and on August 20, 1906 Michigan Sugar Company was born.

Charles Beecher Warren, legal advisor to H. O. Havemeyer and American Sugar Refining Company, was the first president of Michigan Sugar Company. Actual operations of the Company fell upon the shoulders of W. H. Wallace, who served as general manager. Mr. Wallace previously had managed the Sebewaing Sugar Company. Other officers of the new company included F. R. Hathaway of Alma who served as secretary, and H. A. Douglas of Warren's legal firm, who served as treasurer.

The Company prospered from the beginning in spite of recessions, depressions, and business panics. Dividends were paid regularly on both the common and preferred stock through 1925.

As the Company prospered, money was spent on the plants. Pulp driers were installed in those locations that didn't have them; two Steffens houses were built, and capacities were increased over the years.

In 1911 the government brought an anti-trust suit against the American Sugar Refining Company, and secured an injunction which prevented them from taking any further part in the management of Michigan Sugar Company. This did not adversely affect operations but without the American stock voting it was difficult to get a quorum at the stockholders' meetings.

In 1916, Michigan Sugar Company purchased the Toledo Sugar Company, Toledo, Ohio and operated it as a profitable subidiary for a number of years. However, in the late twenties some difficult years resulted in heavy losses, and the Toledo plant did not operate after the 1930 campaign.

Michigan's board of directors in 1956, left to right, R. C. Morley, Jr., S. A. Hill, H. F. Pitcairn, G. S. Childs, E. C. Bostock, H. B. Eldred, R. P. Shorts and A. J. Feuer.

The Company weathered the severe dislocations of production and prices brought on by World War I and its aftermath. Sugar production for the 1916 and 1917 campaigns was reduced almost 50% as a result of labor shortages and competing crops, but began to recover to normal levels again starting with the 1918 campaign.

The year 1924 marked the entry of the Pitcairn interests into the Michigan Sugar Company picture, when they sold their Owosso Sugar Company plants at Owosso and Lansing to Michigan Sugar Company for preferred stock and a small amount of cash. At the time of the sale, Harold F. Pitcairn, who had been president of the Owosso Sugar Company, became a director of the Michigan Sugar Company.

The crop year 1924 was the Company's most successful one since its organization in 1906, both from the standpoint of production and profits. Sugar production that year totaled 1,733,687 bags. The harvested acreage of beets totaled 83,000 and the average sugar content was 18½%.

In contrast to the thriving era of 1906-1924, the period 1925-1933 was an era of small crops and financial losses. The trouble started with the 1925 crop. 79,000 acres were contracted but an abnormal shrink resulted in only 59,000 acres being harvested. Despite rain, sleet and frozen ground, all of the 59,000 acres were harvested, but because of the heavy fall rains and a quirk of nature, the average sugar content was only 13½% and sugar extraction was only 213 pounds per ton of beets.

The growers were paid a guaranteed price of $7.00 per ton, which was obviously not warranted by 213 pounds of sugar per ton of beets in relation to the existing low prices for refined sugar. In addition to the low sugar content and a sizable shrink between beets purchased and sliced, the price of sugar had dropped, all of which resulted in a severe loss for the year.

Following the unhappy 1925 crop year, beet production declined sharply for several years as a result of low sugar prices, higher prices for competing crops, and unfavorable weather. With this decline in production, the fortunes of the Company declined also. The low point of this cycle was reached in the year 1931 when only the Sebewaing plant operated.

During the unhappy economic times of 1931-1934, practically every sugar factory in Michigan, Ohio and Indiana went through receivership with the exception of Michigan Sugar Company, which accepted the burden of deficits instead. To illustrate the severity of the financial wounds inflicted on the Michigan Sugar Company during this period, the earned surplus of $3,400,000, which was reduced to $400,000 at the end of 1925, became completely exhausted, and a deficit of $1,289,000 was accumulated by June 30, 1933. Also, it was necessary in 1928 to float a bond issue of $2,000,000 in order to finance the operations of the Company.

In an effort to breathe life back into the withering beet sugar industry, growers and processors joined hands to form the Farmers & Manufacturers Beet Sugar Association in July, 1932. W. H. Wallace, who had replaced Mr. Warren in 1925 as president of the Michigan Sugar Company, was elected president of the newly formed Association.

On July 29, 1933, Mr. Wallace died as a result of injuries received in an automobile accident. George B. Morley, a prominent Saginaw banker, who was one of the founders of the Company, and 75 years of age at the time, took over as president, but E. C. Bostock, who had been elected to the board of directors in 1929, took over the day to day direction of the Company's activities until Geoffrey S. Childs arrived in 1934.

Harold F. Pitcairn had been a director since 1925, but the Pitcairn interests did not participate in the direct management of Michigan Sugar Company until 1934. At that time the fortunes of the Michigan Sugar Company were at a low ebb. Mr. Bostock and Mr. Childs, president and vice-president respectively, were assigned by the Pitcairn interests to the difficult task of rescuing the Company from the brink of bankruptcy. In 1940, Mr. Bostock was elected chairman of the board of directors, and Mr. Childs was

As this article was being readied for press, the sugar industry was saddened to learn of the sudden death of Geoffrey S. Childs. An indication of Mr. Childs's contribution to the industry is reflected in the foregoing record of the development of Michigan Sugar during his presidency. He had contributed greatly and had made many friends among the fraternity of sugar men, and his passing will be mourned by all those that knew him.

elected president. Both of these men are serving in these offices at the present time.

In the 22 year period from 1934 through 1955 great strides were made toward putting the Company's financial house in order. Operating profits after taxes totaling $9,312,044 were made. With this money the balance of the $2,000,000 of defaulted bonds was paid off, the deficit of 1933 was converted into an earned surplus of $811,902 by September 30, 1955.

This improvement in financial condition was not achieved at the expense of neglecting the factories or agricultural facilities. During this same 22 year period over $6,125,000 were spent on buildings, machinery and equipment for both the operating and agricultural departments so that today it can be said that considering their age, the Company's properties are in good condition.

From 1934 to 1956, and especially in the last 15 years of this period, many revolutionary changes in the agricultural side of the business have taken place. A development of tremendous importance has been mechanical harvesting. Prior to 1945, the entire beet crop was harvested by hand labor. In 1945 one mechanical harvester operated in the Company's entire territory. Today, more than 98% of the crop is harvested mechanically.

The ventilation of piled beets to prevent spoilage was another important development of the agricultural research program. The first successful ventilation operation on a broad scale took place in 1947. Today, ventilation makes it possible for the Company to accept unlimited delivery of beets from growers and store them on the factory grounds, thus speeding the harvest ahead of bad weather.

Modern and adequate beet pilers, first used in 1937, have contributed to the speed and efficiency of handling the beet crop. Research has paid handsome dividends in the development of new and better varieties of beet seed. A new improved drill for fertilizer placement was developed in 1953 by the Research Department. Currently, the Research Department is working on practical ways of using chemicals for weed control and space planting as a means of reducing spring labor.

During the 1934-1956 period, a sizable portion of Michigan Sugar Company's earnings were ploughed back into the improvements and replacement of plant facilities. Boiler houses have been modernized so that all of the plants now have new high pressure boilers. With the boilers, new stokers, ash handling devices and turbine-driven boiler feed pumps have been installed.

All slicers have been replaced and new diffusion batteries have been installed where necessary. The replacement of plate-and-frame filter presses with newer type filters has been completed at all but one plant. Evaporators have been enlarged or replaced and additional vacuum pans have been installed at all locations. New automatic high speed centrifugals have been installed at all the factories.

All plants have been electrified through the installation of turbine driven generators. All sugar packing rooms have been modernized by installing screening devices and modern packaging equipment. In addition, new large mills for powdering sugar have been put in at the Carrollton and Sebewaing plants. Large new warehouses for sugar storage have been built at Carrollton and Sebewaing, and a new pulp warehouse has been built at Caro.

With the changing patterns of agriculture and transportation during the 1934-1956 period, it became apparent that a concentration of processing operations in fewer operating plants would be the most economical method of conducting operations. The Toledo Sugar Company and the Bay City factory were liquidated in 1941, the Owosso plant was sold in 1948, and the liquidation of the Lansing factory began in 1952. The Mt. Pleasant plant, which had been acquired in 1948 from the Isabella Sugar Company, primarily to secure the advantage of its acreage, and the Alma factory are to be liquidated eventually. Beets from the areas formerly served by the plants which have been or are to be disposed of are now shipped and processed at one of the four operating factories at Caro, Carrollton, Croswell and Sebewaing.

Along with all of the other phases of the business, the marketing of the Company's products has undergone many changes from 1934 to 1956. In 1934, the marketing of sugar in Michigan was in a demoralized condition as a result of unethical practices, cutthroat competition and low prices. Under the new management, Michigan Sugar promptly took steps to get the marketing of its products established on an orderly basis. Gradually, the demoralized condition of the market was corrected and the former disorderly practices were abandoned. In 1934 Lamborn & Company, Inc. were appointed as general brokers to handle the sale of the company's sugar and have continued in that capacity over the past 22 years.

Keeping pace with the needs of its customers, the company has added to its assortment of products from time to time. In 1940, powdered sugar production was started and proved a valuable addition to the list of products. Liquid sugar production was started in 1950, and today accounts for a sizable portion of the Company's volume. Bottler's sugar and baker's special sugar, tailored to meet the requirements of specific industries, were put on the market in the early nineteen fifties.

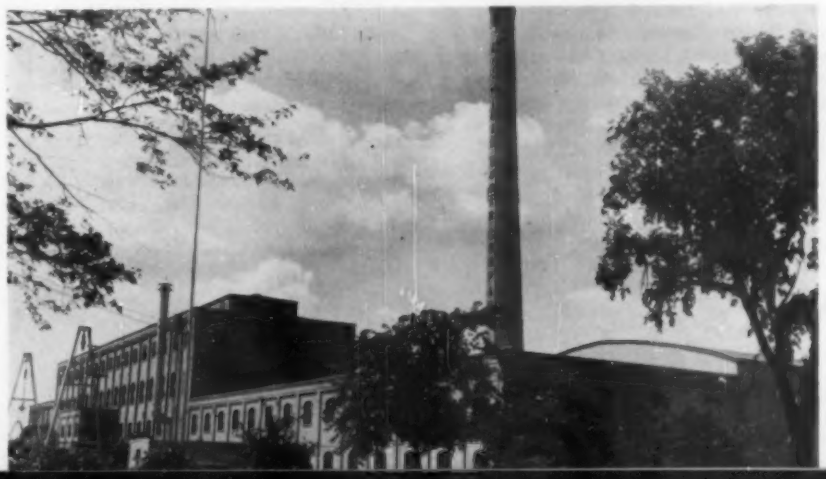
Of equal importance with the physical properties and other assets of any business are the human relationships and goodwill enjoyed by a company. Recognizing this fact, Michigan Sugar Company, during the past twenty-two years, has made a consistent and sincere effort to conduct its activities so as to earn the respect and goodwill of its personnel, growers, customers, competitors, and the general public.

Financial support and active participation have been given to numerous industry organizations and scientific societies, such as the Sugar Research Foundation and Sugar Information, Inc., New York; Farmers & Manufacturers Beet Sugar Association, Saginaw; U. S. Beet Sugar Association, Washington, D. C.; Beet Sugar Development Foundation, Ft. Collins, Colorado, and American Society of Sugar Beet Technologists, Ft. Collins.

To acquaint the general public with the value and activities of the industry, Michigan Sugar Company, along with the other beet processors in the State, embarked upon a public relations program in 1952. The processing companies were joined by the growers as participants in the educational effort in 1955. A weekly radio program, newspaper releases, awards to beet growers and a portable display depicting aspects of the industry have been features of this program.

The caliber and effectiveness of this program was recognized in April, 1956, when the American Public Relations Association awarded it the Silver Anvil, symbolic of the best public relations program in the field of agriculture.

Present appearance of Michigan Sugar Company's Carrollton plant.



facts about sugar

DOMESTIC spot raw sugar prices remained at $5.77 per 100 pounds during most of November. However, this was really a nominal price based on sales of over-quota raws, and, shortly after the outbreak of hostilities in the Middle East, sales of futures and actuals arriving in 1957 advanced to levels above the prevailing spot price, according to B. W. Dyer & Co., sugar economists and brokers.

On November 20, the U. S. Department of Agriculture increased U. S. sugar quotas by 100,000 tons to 8,875,000 short tons, raw value. In making the increase, it was mentioned that: (1) The longshoremen's strike (which has been halted by an injunction expiring Feb. 12, 1957) had caused larger quantities to be held in inventories; (2) Ocean shipping space is less readily available and freight rates have increased; (3) The sharp rise in world sugar prices in the preceding two weeks had reduced the pressure to sell in the U. S. market; and (4) Domestic new-crop futures had risen to the level of the current "spot" price quotation.

Despite this quota increase, the domestic spot raw sugar price advanced to $5.95 on November 29, and reached $6.00 the following day.

Beet processors in the Chicago-West area on November 14 made the $8.50 per 100 pounds refined price, less allowances, effective. On November 22, they advanced $.20 in the Far West to $8.85, and in the Chicago-West territory withdrew the $.20 and $.10 allowances. On November 26, cane refined prices were raised to $8.95 in certain Far Western states. Effective at the close November 30, cane refiners advanced basis prices by $.15 to $9.10 in the Northeast and to $8.85 in the Chicago-West territory. However, in the Southeast the advance was $.10. In all cases, orders were accepted through November 30 for shipment by December 8 at the previous price. On December 3, beet processors advanced $.15 to $9.00 in certain Far Western states, and cane refined advanced to $9.10. In the Chicago-West area, beets advanced $.15 to $8.65. However, through December 7 business was accepted in the latter area at $8.50 for delivery by Jan. 31, 1957.

U. S. sugar quotas were increased by 125,000 tons to 9,000,000 tons on November 30. Although it was stated that supplies appeared adequate to meet distribution requirements, the action was taken to check the upward price trend and to provide even more ample supplies to consumers.

Hearings on 1957 U. S. sugar requirements were held in Washington, D. C., on November 26. Industrial users generally objected to 1956 sugar price increases, and estimated 1957 U. S. requirements at more than 9,102,000 tons. The Cuban Sugar Council estimated U. S. consumption at 8,900,000 tons. The U. S. Beet Sugar Association made no specific suggestions, because of the possibility that sugar will be more responsive in 1957 to international events than to national quota management, but also envisioned that effective quota management may be needed depending on how world conditions affect inventory policy. The Association of Sugar Producers of Puerto Rico and the Mainland cane processors suggested that sufficient consideration be given to the relationship between wholesale refined sugar prices and the cost of living (yardstick).

World spot sugar prices advanced sharply, following the outbreak of fighting in the Suez area, from 3.25¢ per pound at the beginning of November to 5.00¢ on November 28. They then declined, reaching 4.60¢ on December 3. After that, they again advanced, and got up to 4.75¢ on December 5.

The sugar conference at Geneva adjourned November 2, and basic export and special reserve figures of 5,687,000 tons in 1957 and 5,742,000 tons in 1958 were recommended in the protocol (for signature in December). The protocol also provides for five price zones running from below 3.15¢ per pound, where quotas of major exporters can be reduced to 80% of basic tonnages, to above 4.00¢, where quotas become inoperative.

The International Sugar Council estimated that world free market requirements in 1957 would be 5,325,000 metric tons, raw value, compared with the latest estimate for 1956 of 5,080,000 tons. Until the new protocol is accepted, initial quotas for 1957 were set at 4,351,375 metric tons, raw value, or the same as the 1956 quotas now in effect.

Sugar Prices, December 7

Ex Duty Raw Sugar, N. Y.	5.95
Average No. 6 Raw Sugar Jan. 1—Dec. 7	5.57
Refined Sugar Gross, N. Y.	9.10
No. 4 Raw Sugar (f.o.b.) Cuba	4.75
Average No. 4 Raw Sugar Jan. 1—Dec. 7	3.39

Future Prices	*Contract No. 6*	*Contract No. 4*
March, 1957	5.85	4.77
May, 1957	5.80	4.75
July, 1957	5.85	4.76
September, 1957	5.87	4.76
March, 1948	—	4.40

HST and HSPA Hold Lively Meetings

Stimulating meetings by the Hawaiian Sugar Technologists, and three weeks later, by the Hawaiian Sugar Planters' Association closed the year for the Island's sugar industry.

Hawaiian Sugar Production

To December 1, 1956	1,090,514 tons
To December 3, 1955	1,131,328 tons
Total 1955	1,140,112 tons

At the 15th annual meeting of the Hawaiian Sugar Technologists, held from November 12 to 15 at the HSPA Experiment Station, some 100 separate presentations on specialized phases of the sugar industry were given in seven sections—agricultural, automotive, chemical and engineering, cultivation and weed control, harvesting, industrial engineering and industrial relations.

About 600 persons, a record turnout, attended the sessions. HST currently has a membership of over 1,250. Although founded in 1938 under that name, its origin goes back to 1902. In that year, HST's forerunners, the Hawaiian Sugar Chemists Association and the Honolulu Engineering Association got underway with a combined membership of 29.

Outgoing president is R. C. Williamson, assistant manager of Kekaha Sugar Co. President for 1957 is William W. Paty, Jr., industrial relations director of Waialua Agricultural Co. President-elect for 1958 is Alvan C. Stearns, assistant manager of Kohala Sugar Co.

Opening day speakers for the Technologists included, C. Hulton Smith, senior vice-president of American Factors, representing Mr. G. W. Sumner, Amfac and HSPA president. He stressed that "in this age of specialization, we must have the know-how if we are to keep up with our competitors. While the future looks bright, we must continue to concentrate on increased production, research and development of our people."

Slator M. Miller, HSPA vice-president and Washington representative, reporting on the Washington picture, said the highlight of

this year was the passage of the new Sugar Act and the events leading up to it. He paid tribute "to our beet friends for maintaining a united front under much internal stress and strain."

The 76th annual meeting of the Hawaiian Sugar Planters' Association, held on December 3 to 5 at the Experiment Station, was attended by 150 top executives of the Island's sugar industry.

Highlights of the opening session were the presentation of his annual report by George W. Sumner, HSPA president, and an address by Paul F. Clark, president of the John Hancock Mutual Life Insurance Company. Mr. Sumner's report on the year's activities in the sugar industry included a sound-color movie, dealing principally with research work. Mr. Clark spoke on "Winning the Battle of Inflation."

Others on the opening day's program were Dr. Henry B. Hass, president of Sugar Research Foundation; Donald Maclean, president of the California & Hawaiian Sugar Refining Corp., and Dr. Roy E. Brown, director of the Tax Foundation of Hawaii.

Speakers on the second day of the meetings included: Slator M. Miller, "As Seen From Washington"; David Quinlan, advertising and public relations coordinator of Sugar Information Inc., "Changing an Attitude," and Dr. A. J. Mangelsdorf, principal geneticist of the HSPA Experiment Station, "International Society of Sugar Cane Technologists—India and Hawaii."

A Maui experiment in emergency storage of sugar out-of-doors ended recently at the Kahului waterfront. Kahului Railroad Company men peeled away a giant plastic tarpaulin which has covered a pile of sugar for three and one-half months. The 2,661 tons of sugar was reported to be in good shape, but final results of the experiment await complete laboratory analysis of the sugar.

The sugar, which is two days' production for Maui's three plantations, was piled July 20 on a special area paved with asphalt. Black polyethylene tenting material was sand-bagged down over it. Goal of this joint Maui Planters' Association-Kahului Railroad Company experiment was to find a cheaper and easier way to store Maui's sugar when normal storage facilities are full.

Construction has started on a $90,000 excess bagasse handling and storage facility at Ewa Plantation Co. Two sets of conveyors being made in Ewa shops will connect the storage plant with the mill fireroom.

Modernization of the bagasse-handling operations will enable Ewa to store excess bagasse which formerly was trucked away to the fields. This surplus of bagasse will be used to generate additional power during the weekends. The new bagasse storage plant will have a capacity of 900 tons.

Arrangements to test new chemical soil fumigants under Hawaiian conditions have been made by J. P. Martin. The principal pathologist of the Hawaiian Sugar Planters' Association Experiment Station made the arrangements during a two-month business-vacation trip to the mainland.

At the HSPA meeting, Dr. F. E. Hance, principal chemist at the Experiment Station, shows Dr. Henry B. Hass, president of Sugar Research Foundation, an experiment developed at the Hawaiian station for the use of sugar esters in the manufacture of a herbicide.

Mr. Martin visited a number of chemical firms and the University of California at Berkeley and Riverside in relation to soil fumigation work. One of Martin's chief projects is the study of yield decline in sugar cane—the decline in yields of well-established cane varieties as the years go by. He is looking into the part soil fumigation may play in preventing yield decline. Soil fumigation is the treating of soils with chemicals to control biological factors such as nematodes and fungi.

Usefulness of the Merry Tiller, a hand tractor used widely throughout Hawaiian plantations, was recently increased by the ingenuity of a junior industrial engineer at Hawaiian Commercial & Sugar Co. Arthur Shinyama had developed a disc attachment for the Merry Tiller for use in covering replant seed in ratoon fields.

The Merry Tiller is used for digging trenches for seed and was used in covering seed in fields recently plowed where the soil was loose. The Merry Tiller was impractical in ratoon fields. Where the soil was loose on top but hard underneath, the tiller seed covering plow tended to rip the seed out of the ground.

Working a year on the problem, Mr. Shinyama developed the attachment composed of two discs shaped like pie plates. Gear-like teeth are cut along the outside edge. The Merry Tiller pulls the device along and the discs scrape the loose surface soil. The movement turns the plates which lift the loose surface soil up and over the seed.

Hawaii's 1956 sugar quota was 1,136,305 short tons, following the 135,000 ton increase on November 30 of the amount of sugar allowed into continental U. S. market. Hawaii's share in the new increase was 15,665 tons, making the Island's quota for mainland delivery 1,091,305 tons. Local consumption is unchanged at 45,000 tons. The latest quota hike is the fourth in which Hawaii shared.

Records Set by U. S. Beet Areas

The 1956 U. S. sugar beet crop was making record-breaking history in the four-state area served by the Great Western Sugar Company, when we went to press. Frank A. Kemp, president said in November that the first company payments to beet growers would total $28,180,000 in Colorado, Nebraska, Wyoming and Montana. Checks for $27,252,100 were mailed November 19 from 18 company factories for beets delivered through November 4 amounting to about 97 percent of the crop, and $927,900 was to be paid December 15 for the wind-up deliveries after that date. Additional payments were expected during the "sales year." The initial payments averaged slightly over $10.00 per ton in the Colorado-Nebraska-Wheatland, Wyo., area, and flat payments of $10.25 at Billings, Montana, and Lovell, Wyoming.

Mr. Kemp said that growers were also receiving Sugar Act payments returned to the grower in connection with the tax levied

on the processor. Combined company and government payments was expected to bring total autumn returns to Great Western growers to about $35,225,000, or an immediate average of $12.60 per tons, with prospect of more as the sugar is sold.

Mr. Kemp cited the following records achieved by the 1956 crop: "The average yield of 15½ tons per acre on 180,600 acres is the highest in company history on an acreage of this size.

"Sugar content of the beets averages over 17 percent for the 4-state area. Sugar content in Colorado is the highest in six years. In Nebraska it is the highest ever recorded, and in the Billings-Lovell area it is the highest in more than a decade.

"Virtually complete mechanization of the harvest was accomplished and thinning machines were used for spring work on more acreage than last year.

"After two disappointing years marked by serious drouth and reduced production." Mr. Kemp said, "the 1956 crop has come through magnificently. With acre-yields running two-thirds of a ton above the ten-year average over the entire territory, some astonishing individual performances have been recorded. We have had cases of 22-ton yields testing 19 percent sugar on sizable acreages which will give such farmers a gross return of more than $300 per acre."

Meanwhile, Great Western factories were processing the crop at the rate of about 33,000 tons of beets a day. Five of the slicing factories were scheduled to conclude the operation in late December and ten to run into the new year.

Mr. Kemp also said that "revolutionary" developments were taking place in utilizing the by-products of the beet. New mechanical techniques for recovering beet tops for livestock feeding came widely into use in 1956. On the factory side, the company is now producing monosodium glutamate and potash in substantial quantities, and the by-products of the "MSG" process result in high-protein compounds used for enriching beet pulp.

Sugar content in beets harvested in the Torrington area (Wyo.) were running more than 17 percent, the highest in several years, according to a late November report of C. L. Kelsey, chief agriculturist for Holly Sugar Company.

About 10 percent of the sugar beets were still in the ground, but Mr. Kelsey said the harvest should be completed in two weeks. He said it would be finished earlier if weather conditions were favorable.

Mr. Kelsey forecast that the sugar beet campaign at the factory would run 67 to 70 days this year. This is about 25 days longer than last year, when the Torrington area crop was curtailed by hail and flood damage.

Record Brazilian Production Predicted

According to the latest reports by the regional inspectors of the Brazilian Agricultural Department, cane planting in Sao Paulo has received a new impulse this season. High prices for the various sub-products have revived interest in Cajuarua and other zones, where cane has been considered of secondary importance in recent years. The demand for seed and fertilizer has increased. The harvest is expected to yield 710,000 tons in Araraquara, 620,000 in Araras, 180,000 in Presidente Alves, 96,000 in Taquaratinga, 84,500 in Lencois Paulista and 76,000 in Palmital.

In Ribeirao Preto farmers now look upon cane as their most remunerative crop, with a higher average profit per acre than any cereal. This region, which includes Cravinhos and Serrana, should havest 285,000 tons in an area of 16,200 acres.

According to official figures published in November Sao Paulo production of sugar had reached 656,700 tons by October 15. Last season's total output was 776,559 tons, a drop of 92,529 tons from the 1954-55 level, caused by adverse weather conditions.

Brazilian Sugar Production

Total 1954	2,330,216 tons
Total 1955	2,280,261 tons
Jan. 1 to Sept. 30, 1955	1,425,586 tons
Jan. 1 to Sept. 30, 1956	1,438,618 tons

Over-production of cane has become a problem in the northern zone of Pernambuco, where farmers were threatened with the loss of 45,000 tons of cane in November. The president of the Planters' Association explains that the transport system is deficient and none of the mills in that district have sufficient capacity to deal with the season's crop.

At a meeting of the Syndicate at Nazare de Mata, one of the most seriously affected municipalities, arrangements were made for the proprietor of Usina Muribeca to grind 23,000 tons of the excess, provided it was delivered at a point whence his locomotive could haul it to the mill. The question was then referred to the Minister of Communications in Rio, who instructed the state-owned Northeastern Railway to effect the necessary transportation. With the exception of the Sao Paulo system, all the railways serving Brazil's agricultural districts are overloaded at harvest time, causing heavy delays and crop losses.

Agricultural and industrial processes are improving in Pernambuco, but still lag behind those of the more favored South. Modern methods of soil preparation and planting, with a more generous use of suitable fertilizers and insecticides, are spreading gradually and mechanization is increasing. Loans granted by the Institute to finance purchases of fertilizer have practically doubled in recent years, but the yield of cane was still only 16.03 short tons per acre in 1954, as compared with 22.05 in Sao Paulo. An official of the Sugar Institute attributes Pernambuco's low agricultural yield in part to failure to start and finish harvesting at the proper periods.

A higher level of industrial efficiency in Pernambuco is shown by increasing yields of sugar per ton of cane. Comparing the seasons 1953-54 and 1954-55, the number of mills obtaining less than 90 kilos per tons has dropped from 15 to 13, those with yields between 91 and 100 have decreased from 21 to 19, while mills obtaining between 101 and 110 kilos have increased from 15 to 20.

If production of alcohol is included with sugar on the basis of 44 kilos to 60 kilos of sugar, the overall industrial yield per ton of cane is 98.51 kilos in Pernambuco as against 97.07 in Rio de Janeiro and 95.70 in Sao Paulo, according to figures recently published by the Sugar Institute. Pernambuco is Brazil's second biggest alcohol distiller. The output in 1955-56 totaled 79 million liters in Pernambuco and 132 million in Sao Paulo.

Production of usina sugar in 1956-57 is expected to reach 759,000 tons in Pernambuco, 844,800 in Sao Paulo and 303,600 in Rio de Janeiro. Based on the official production quotas for 1956-57 the northern crop should yield 1,206,084 tons, the southern, 1,324,620. The revised total for all Brazil is 2,530,604 tons.

Although production was well maintained, exports have had to be restricted during 1956, in order to avoid shortages on the domestic market. Stocks on hand at January 1, 1956, were down to 423,106 tons and only 21,035 tons had been released for exportation at August 1. The corresponding figures for 1955 were 927,161 tons on hand and 420,431 sold abroad.

Cuba Readied for Larger Crop

As the 1957 campaign grew near, the majority of Cuban sugar centrals had complied with the presidential decree ordering the repair of their technical facilities. Date for commencement of the campaign had not been set as of this writing, but indications were that it would be earlier than last year, when grinding of the first mill began on January 16.

The 1957 crop has been set by government decree at 5,150,000 Spanish long tons (5,850,000 short tons, as against 5,250,000 short tons in 1956) but the consensus in the industry is that, as an aftermath of the drouth, production will not come up to this figure.

The sugar cane experimental station at Jovellanos, directed by Roberto Barreto, has introduced into Cuba the following new varieties of cane: C.P. 1, B.39246; B.11569 and CI. 41-70. These varieties originated at the U.S.D.A. experimental station at Beltsville, Maryland. The introduction of these varieties came after it was discovered that the first mentioned variety was immune and the other resistant to the Ratoon Stunting Disease.

The Cuban position in the world sugar market brightened greatly after the purchase by Germany and England of 400,000 tons of sugar of the 1957 campaign. Well received also was the notice that Cuba had totaly

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24"	12"	1,570	250
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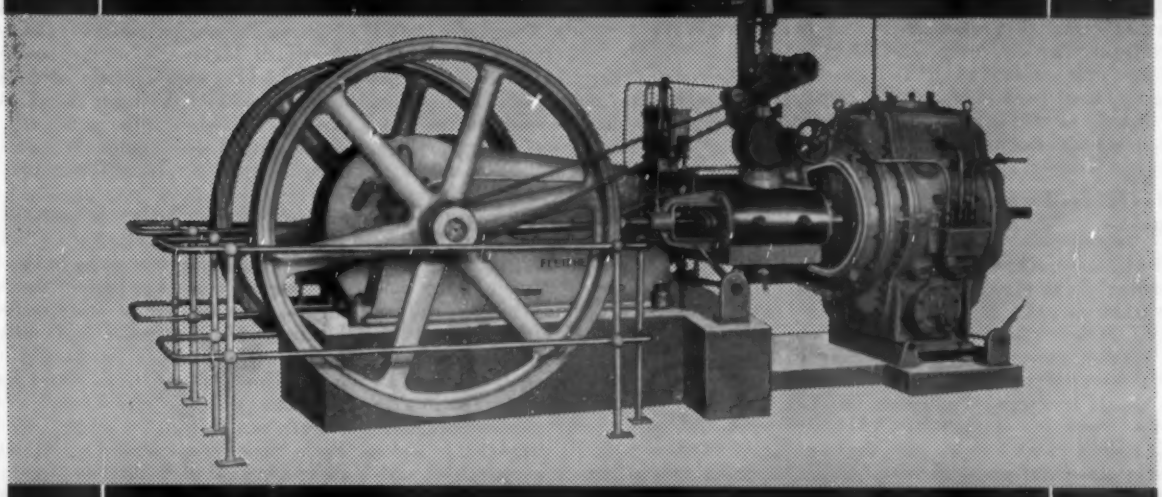

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liquidated her reserve for the world market, and in order to meet consumption demands, the Cuban Sugar Institute had taken about 180,000 short tons from the Reserve or Retained Quota destined for the United States market.

By far the most interesting Cuban declaration of the past months was that made by Amadeo Lopez Castro upon his return from the International Sugar Conference at Geneva. "This sugar agreement," said Mr. Castro, "is an example of the progress which has evolved by means of economic coordination in a world-wide sphere of basic products; it is the only one up to now in which such efficacious results have been accomplished."

"The first benefit for Cuba is the reasonable stability of the price of sugar . . . This stability means that the sugar industry can develop with reasonable profits and that the economy of our nation . . . will reach a satisfactory plane."

"Also," he continued, "it is evident that the stability of the world market will allow the salaries of the sugar workers to be reasonable and just, which could not even be considered if we were to be led into a price war. Were such a price war to develop no country would suffer worse effects than Cuba."

Mr. Castro went on to state: "Since the unsuccessful Conference in New York, Cuba has followed a responsible policy in accordance with the general interest of each nation . . . This is the reason I knew that Cuba would not sell sugar outside of its agreements, but would sell based on a real demand of markets that other exporters could not satisfy."

The next Cuban campaign," he continued, "will eliminate the last 350,000 tons of the 'financed quota' that was accumulated in 1952. By the first of January of 1957 Cuba will have only a normal stock . . . Logically, we should have the same conditions for 1958, and also the security of a stabilized price in accordance with the Agreement."

P.R. Output Estimated at 1,200,000 Tons

The U. S. Department of Agriculture has announced the elimination of restrictions on Puerto Rico's cane production quota for 1956-57. It is estimated that production for the coming campaign will not exceed 1,200,000 tons of sugar, even if all available cane should be ground. Production for the previous campaign amounted to 1,152,000 tons, or about 28,000 tons less than the combined local and continental marketing quotas allotted to the Island. Furthermore, under the recent amendments to the U. S. Sugar Act, providing for participation by domestic areas in the increases in U. S. consumption estimates, Puerto Rico's export quota has been increased several times. The Department has also taken into account the hurricane which struck the Island on August 12, 1956, causing considerable damage to the cane crop and resulting in a reduction of sugar production of about 90,000 tons.

Considering all these factors, it is estimated that by January 1, 1957, the Island's sugar surplus will be below 70,000 tons. The Department believes that this carryover is below normal, which accounts for the authority to harvest and grind all the available cane in 1957. To November 30, 1956, the Department has made four increases in the U. S. consumption estimate, in an effort to keep the retail price of sugar down; this has raised the estimated national consumption quota from 8,350,000 tons of sugar to 9,000,000 tons. This situation has helped Puerto Rico a great deal in reducing its sugar surplus and in enabling cane producers to harvest all available cane for 1957.

The Puerto Rican Sugar Technologists Association, under the presidency of Agripino Roig, Jr., held its Annual Assembly on December 1 and 2 at the Escambrón Beach Club in San Juan. The opening speech was delivered by Lic. J. B. García Méndez, executive vice-president of the Puerto Rican Sugar Producers' Association. The works presented to the Assembly were as follows:

"An Efficient Technique for the Manufacture of Bulk Sugar," by Alfred L. Webre; "Experiences in the Handling of Bulk Sugar," by R. F. Goodwin (assistant general manager of South Porto Rico Sugar Co.); "Mechanization in Cane Plantations," by Marcel Mitchie (representative, Thomson Machinery Co. of Louisiana); and "Manufacturing Problems Arising from Canes Harvested Mechanically," by Fernando Villamil (assistant to the president of Central Aguirre).

The closing speech was delivered by Cándido Oliveras, president of the Puerto Rican Planning Board. The meeting ended with a banquet at the Escambrón Beach Club.

The National Farm Loan Association and the Production Credit Association annual meetings, held simultaneously in the auditorium of the University of Puerto Rico, were attended by about 1,400 members of these credit agencies. Over 80 percent of the borrowers from these credit associations are cane growers, who use the loans to purchase farms and to finance cane plantings. The principal speech was delivered by the Hon. Luís Rivera Santos, Secretary of Agriculture, who pointed out that the farm credit system prevailing in Puerto Rico was neither adequate nor sufficient to satisfy the needs of an agricultural industry which is turning to mechanization and the adoption of better production methods. He stated that he had a meeting with all the ex-secretaries of agriculture to discuss the problems affecting agriculture on the Island and that they had come to the unanimous conclusion that the most urgent step was the improvement of the farm loan systems.

Through a series of conferences and meetings in various cane producing areas on the Island, the Puerto Rican Sugar Producers Association has been conducting a praiseworthy campaign aimed at divulging and promoting the technical advances in cane culture. A group of technologists from the Agricultural Experiment Station of the University of Puerto Rico is taking an effective part in these meetings, explaining in a simple manner with graphs and films the results of farm experiments and how to apply this new knowledge to improve can growing practices. These meetings are held with cane producers in each district supplying a certain factory in order to convey to them the latest information on new cane varieties, irrigation, fertilizing, drainage, cane diseases and pests, field mechanization and services available to colonos.

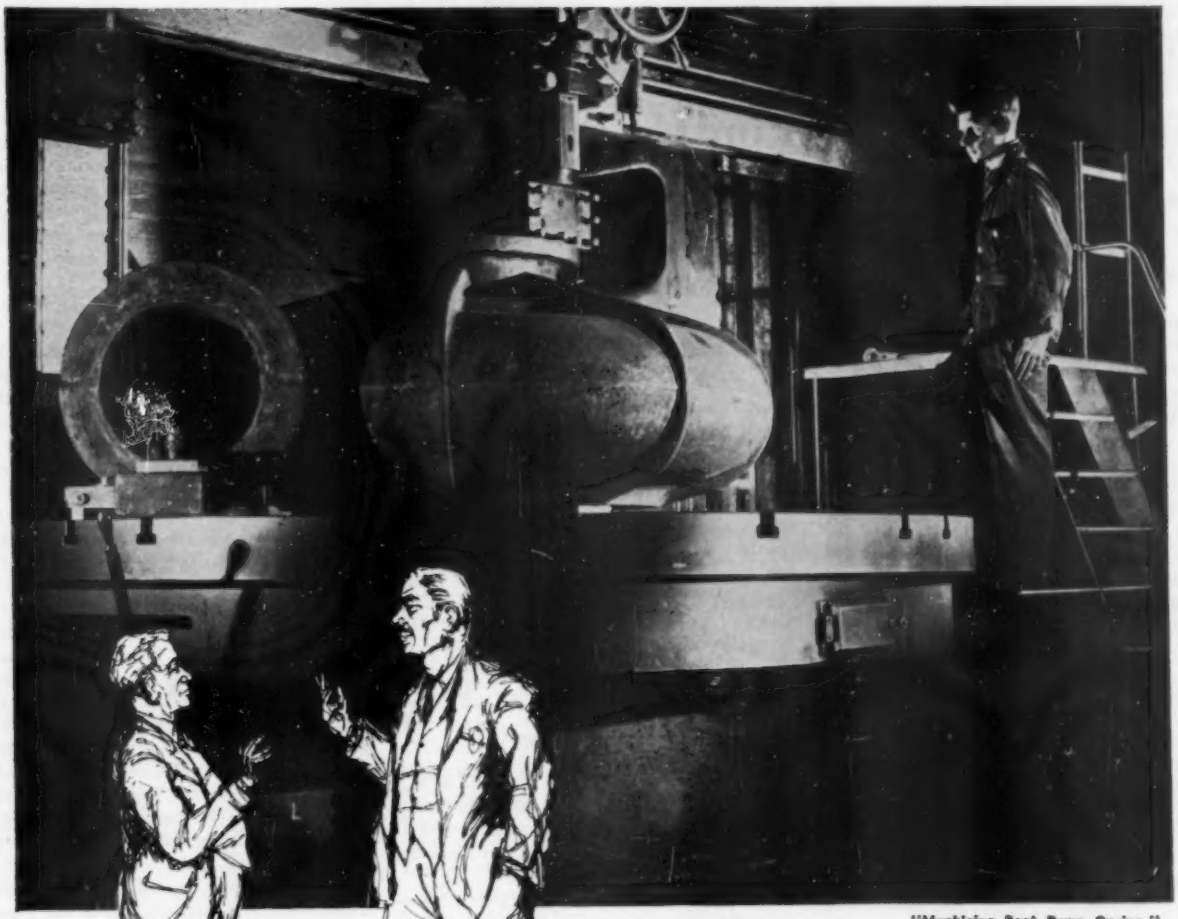
Through these meetings, the growers are also offered an opportunity to report and discuss with sugar mill directors the various problems faced by the former and to devise means for their possible solution. These activities, while aiming at improving farming efficiency, also have a beneficial effect in promoting a better understanding between mill owners and growers. The Association is also cooperating in publicizing and promoting mechanization and the adoption of better farming methods by conducting excursions of technologists and colonos to cane producing areas with outstanding results. These excursions usually include demonstrations of mechanical cultivation and fertilizing, use of herbicides, handling of mechanical harvesters and other improved farming practices. Activities of this type have been successfully carried out in cooperation with the following centrals: Mercedita, Plata, Coloso and Guánica.

A-1 Harvesting Season in Louisiana

The Louisiana sugar cane farmers and mill operators enjoyed a remarkable harvesting season during the months of October and November despite the fact that two or three killing freezes were experienced during the closing weeks of the latter month. At this writing, December 6, the weather is warm and reports of some trouble are beginning to filter in from the country parishes but a great many farmers have already finished the crop and a number of mills are also through for the season.

The 1956 grinding campaign has produced one innovation in cane hauling that should interest cane growers of other sections. It has long been the custom in Louisiana to bundle cane in slings for hauling to the mills. This year the Gulf States Land & Investment Company who, it will be recalled, recently acquired all the properties of Godchaux Sugars Inc., installed a new system at their Raceland mill that does away with slings and apparently speeds up the unloading operations. Thirty-two administration cane wagons have been modified by adding about two feet to the height of each wagon. Four chains have been attached or fixed to the right side of the wagons. The chains are laced together at several places to form a chain mat. The four chains are allowed to

(*Continued on page* 45)



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Further Discussion on Crystallizers

EDITOR SUGAR:

With much interest we have read the article by V. E. Baikow, "Crystallizers for Low Grade Massecuites," published in SUGAR, July 1956, page 55.

Although we agree in general with the tendency of this article we should like to make a few remarks in connection with the cooling in the so-called rapid crystallizers.

1. The author seems to be strongly in favor of a slowly elapsing cooling resp. after crystallizing process for low grade massecuites. For a new designed factory there is no other objection than the fact, that the after product crystallizers are numerous and require comparatively much floor space. However, when an extension of the capacity is considered this part of the installation is often overlooked, so that a proper retention time cannot be achieved. On many occasions a lack of the necessary floor space will hamper the extension of the crystallizer station. The result of all this is a continuous compromise of the factory capacity and the PQ of the final molasses.

2. However, the author seems also to be convinced that rapid crystallizers are a necessity and in this connection he mentioned the Werkspoor crystallizers.

3. As far as we can see the author has only in view the batch crystallizers with forced cooling. Such crystallizers are manufactured by us; they are provided with rotating cooling pipes.

4. By means of a special water distributing system the temperature difference between the massecuite and the cooling water is virtually equal over the entire contents of the trough. The usual retention time is 16-17 hours per strike.

5. The author however, does not mention the Werkspoor *continuous* working rapid crystallizer which, originally designed for high grade massecuites, gradually gains application in the field of after crystallization of after product massecuite. We, therefore, called your attention to our booklet "Many Years of Experience [23 years] with WS Rapid Crystallizers." In this booklet, you will find the essentials on which the Werkspoor crystallizer is designed.

It must be pointed out that this kind of rapid crystallizer is not meant for *batch* cooling.

6. Further we draw your attention to the fact that false grain or smear *never* is formed during the after crystallization in Werkspoor rapid crystallizers.

7. By including sufficient intermediate (storage) crystallizers, the retention time recommended (by the author) for the first hours without forced cooling can be obtained.

8. As an example of a recent alteration, we made in the after product station of the sugar factory Vierverlaten-Groningen, Holland we give you the under following figures.

Camp	*Pur. Mass.*	*Pur. fin. mol.*	*Pur. Diff.*	
1953	81.3	63.7	17.6	without rapid cryst.
1954	82.0	64.7	17.3	without rapid cryst.
1955	80.4	61.5	18.9	with rapid cryst.

In the 1953 and 1954 campaigns the average retention time was about 32 hours per strike, while in 1955 the retention time was reduced to about 21 hours per strike. The last figure consisted of 2 hours storage trough, 5 hours flow through rapid crystallizer and 14 hours after ripening in ordinary crystallizers.

Werkspoor N.V.
Amsterdam, Holland

Author's Comments

In reply to the letter of Werkspoor N. V., Amsterdam, I would like to make the comments listed below, the paragraphs of which I have numbered to correspond to those in the Werkspoor letter.

1. I am in favor of a comparatively slow rate of cooling in crystallizers because it is a requisite of the physical phenomenon of crystallization in a low grade massecuite. It is true that slow cooling requires greater floor space, but in the long run it is cheaper to provide additional crystallizers than to lose sugar continuously in final molasses. The author of the letter himself states:

"The result of all this is a continuous compromise of the factory capacity and the purity of the final molasses."

2. I did not recommend "rapid" crystallizers, but suggested crystallizers with sufficiently large cooling elements to be able to accelerate cooling of low grade massecuite toward the end of the curing period. In this connection I mentioned several types of crystallizers.

3. Since crystallization of low grade massecuite in a vacuum pan (at present) is a batch operation, I do not see any necessity for continuous crystallizers in this phase. Some sort of intermediate recipient between vacuum pan and continuous crystallizer would be required anyway.

4. A retention time of 16-17 hours per strike is too short for proper curing and exhaustion of final molasses, unless strike is of low Brix or contains an excessive amount of invert sugar. In these cases curing time is immaterial.

This conclusion is based on my experience of over 30 years in the sugar industry.

5. I believe that rapid crystallizers can be very beneficial for high grade massecuites and particularly in refineries for white sugar massecuites. However, I was discussing in my article only low grade cane massecuites.

6. On many visits to Argentina where a Werkspoor rapid crystallizer is installed in one sugar factory, I had an opportunity to observe a smear in many low grade massecuites purged after being cured in the rapid Werkspoor crystallizer.

7. I agree with the writer of the letter on this paragraph.

8. In my article on crystallization for low grade massecuites I talked about *cane* massecuites of about 58 purity, while the author of the letter gives the figures of *best* massecuites of over 80 purity. The purity of final beet molasses of 61.5 is nothing outstanding and it should be 55-58.

Besides the author of the letter does not give comparative Brixes of those beet strikes. A low Brix strike can be kept indefinitely in crystallizer without much decrease in purity of final molasses.

V. E. BAIKOW
Consulting Engineer

■

The death of James R. Mason, 62, one of the most widely known executives in the beet sugar industry, was discovered by his wife, Eva Rang Mason, on November 3 at their home in Denver. No indication of illness had been apparent when Mr. Mason retired the previous evening.

Frank A. Kemp, president of The Great Western Sugar Company, which Mr. Mason had served for forty years, said: "His death will be deeply regretted by the hundreds of company people and farmers who knew him intimately throughout the West." Mr. Mason had served as manager of all the company's major districts: Montana, 1936-39; Nebraska, 1939-43; Colorado, 1943-49; and head of the enlarged southern district until his death.

James R. Mason was born February 22, 1894, at Frankfort, Kansas. He attended elementary schools in Kansas, and was graduated in 1916 from Kansas State Agricultural College. He entered Great Western service as a fieldman at Sterling, Colo., in 1916, and served briefly as fieldman at Missoula, Montana, prior to enlisting in the Marine Corps in 1918. Returning from war service in 1919, he resumed his work at Sterling.

James R. Mason

Chemical Mixing Without A Tank

THE American Homomix is a rapid mix unit which accomplishes instantaneous, violent, uniform blending of a liquid and one or more chemicals without the use of a mixing tank. It has seen 10 years of successful, efficient, and trouble-free operation in the fields of water treatment, waste disposal, chemical process and allied industries.

Essentially, the Homomix is an enlarged section of a pipe line containing baffles, rotating impellers, and feed tubes for chemical additives. Operation of the Homomix can best be explained by referring to the accompanying figure. This illustration depicts one complete stage comprising a baffled mixing chamber, rotating impeller and chemical additive tube. There are three distinct types of mixing actions occurring, the different zones being marked X, Y, and Z. Consider the influent, N, flowing in an upward direction. The additive, A, is brought in through the chemical feed tube to the eye of the mixing impeller, the first mixing zone (X). The rotating impeller, with a capacity, p, greater than the additive rate, a, draws into the eye all of the additive, A, plus additional mixture to make up the difference, p-a. Thus, in the impeller, mixing zone X, a gpm of additive are blended with p-a gpm of mixture.

The mixture discharges from the periphery of the impeller forming a plane perpendicular to the direction of flow of the influent, N, and establishing the second mixing zone, Y. In zone Y, p gpm of mixture are combined violently with n gpm of influent. A portion of this mixture will form the input to the impeller eye as the mixture flows upward.

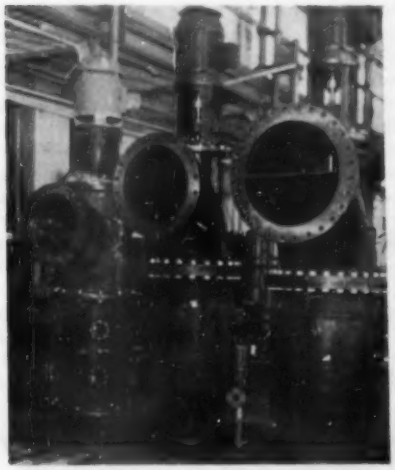
The final mixing in Zone Z is accomplished by the turbulence created by the mixing impeller, the baffles, and the velocity of the influent.

In this way the velocity head of the influent stream is exploited to provide maximum mixing action with a minimum power requirement by the impellers.

The instantaneous dispersion of the additive into the influent makes the Homomix particularly well suited to automatic pH and conductivity control.

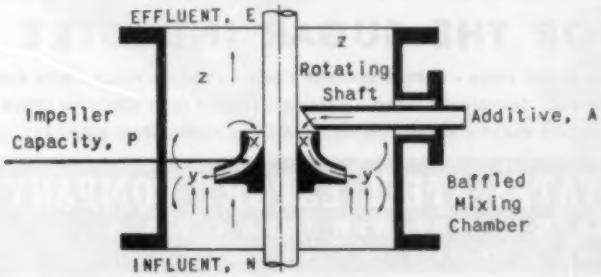
Head loss in the Homomix is also low, varying from about 0.5 to 1.5 times the velocity head per stage with velocity head based on the flow in the equivalent pipe line size.

The Homomix is ideally suited for the continuous blending of two or more fluid streams In the sugar industry specifically, it has given excellent results in the addition of lime to sugar syrup and in the addition of phosphoric acid to limed sugar syrup. These operations have been carried on using pH control.



Four Homomix units ranging in pipe line size from 2 in. to 30 in.

Flow diagram of Homomix mixing stage.



In addition, there are several Homomix installations in which carbon dioxide, either as a pure gas or as flue gas is being added to a liquid stream.

Iron and steel, bronze and stainless steel are standard materials of construction. However, the Homomix can be fabricated in virtually any material of construction common to pipe lines and can be lined with such materials as rubber and polyvinyl chloride. Each Homomix installation is individually engineered for the specific application using standard production components to combine minimum production cost with custom design. Pilot plant facilities are maintained as a customer service to obtain design data where necessary to adapt the Homomix to special applications.

A complete description of the Homomix including performance curves and capacity tables has been presented by The American Well Works in their HM Technical Supplement Addendum #1.

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(*Continued from page* 42)

slack along the bottom of the wagon and up and over the left side in the conventional manner. Instead of having sling locks or dogs, all four chains have been attached to a bar or pipe resting on a rack which is about one foot from the top on the outside of the left side of the wagon.

"Cane is loaded into these wagons in the field in the conventional manner but there are no slings to be locked or tightened. When the wagons reach the mill either a drag line or an engine driven hoist grabs the pipe bar on the left side of the wagon. As the bar is lifted the cane is dumped into a pit on the right side of the wagon. It takes from 12 to 20 seconds to make the grab, lift, and dump the load. This is done by one man, the operator of the hoist."

Nine weeks of the Louisiana pricing period were completed on December 6 and the Louisiana Sugar Exchange reported that the average price of raw sugar to that date was 6.245, about 33 cents a hundred pounds better than the average price at the same time last year. The average price of blackstrap molasses on December 6 was 24.292 cents a gallon and this is almost 14½ cents a gallon better than the average was at this time last season.

The general opinion seems to be that the price of blackstrap will hold fairly steady until the pricing period for this commodity ends on February 28, 1957 but the industry is a little dubious about the price of sugar.

SUGAR ABSTRACTS

Published under the Auspices of the International Society of Sugar Cane Technologists by Special Arrangement with SUGAR—Dr. O. W. Willcox, Editor

Sugar Factory Technology

Theory of "Ion-Exclusion"

D. R. ASHER, *Industrial Engineering Chemistry*, vol. 48, No. 9, pp. 1465-66 (1956).

The Dow Chemical Co. has developed a series of synthetic cross-linked resins (styrene-divinylbenzene in a co-polymer matrix) which have the property of separating soluble non-ionic substances such as sugars from ionized substances such as sodium chloride and other soluble mineral salts.

As is well known, various other kinds of synthetic resins are being used to remove mineral matter from solution, and are being employed on a large scale to soften hard water for industrial and domestic use; they have been used to some extent for demineralizing sugar beet juices. The resins employed for these purposes are called "ion-exchange resins," and are of two kinds which are used in succession. In the first stage, the sugar solution is passed through a tank containing a "cation exchange resin" which absorbs the basic elements (Na, Ca, Mg, etc.) of the soluble mineral salts in the solution and sets free the acidic elements (Cl,So_3 etc.); the solution then passes through a second tank containing an "anion exchange resin" which absorbs these acidic elements and the sugar solution becomes practically free from scale-forming and molasses-forming materials.

However, two circumstances stand in the way of general use of these "ion-exchange-resins" in the sugar industry. One is that they require periodical regeneration to restore them to their original condition, and the other is that the liberation of acids causes some of the sugar to be decomposed; together, these circumstances render their use more or less unprofitable.

The new Dow resins are of a different nature. They are not "ion-exchangers" but "ion excluders." Their action is not chemical, but physical. The ion-excluding resins simply absorb the passing molecules of mineral salts without spliting them; hence there is no formation of acid. When the resin has absorbed these salts to the limit of its capacity, the flow of sugar juice is stopped, and the absorbed salts are washed out by water, and operations are resumed. The two-bed system and the expensive regenerations are dispersed with.

The two best resins for these purposes are Dowex 1 and Dowex 50. With these, the juice may be passed at a high temperature, which reduces viscosity and increases flow rate. Recovery of sugar can be 100%. The system has successfully gone through the pilot-plant stage. One of its advantages is the possibility of recovering valuable by-products such as aconite and amino acids.

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Automatic Control of Standard Liquor Brix

W. P. MURRAY, *International Sugar Journal*, Vol. 58, No. 694, pp. 273-275 (1956).

Essence of the standard liquor system is that all thin juice should go through the evaporators so that thick juice Brix is at a minimum and compatible with the desired standard liquor Brix. In an Irish beet sugar factory manual control of Brix was effected by a thin juice connection to the melter, and operated by the attendant at that station who was dependent on the average hourly average analysis. The results were unsatisfactory because these averaged analyses mask the frequency and speed of variation in the moment-to-moment process figures. The tendency was to over-use thin juice, causing occasional periods of abnormally high Brix and trouble at the presses.

This defect was remedied by taking control of Brix from the melter attendant and putting it in charge of the first massecuite boiler, who was provided with a Kent indicating-recording apparatus based on comparative weighing of liquor and water columns by air reaction. A liquor sample is bled continuously from the pressure side of the pump to the refinery filter presses through a 3-term pneumatic controller that actuates a Hamman-Dahl valve on the pipe line which admits thin juice on the suction side of the filter press pump. The pump now acts as a fast, low capacity blender, with minimum lag in the control loop. This does away with low Brixes associated with momentary throughput rates, so that the true weighted average is less than the apparent average. Tight control is now practicable and the first massecuite boiler is able to make the fairly frequent readjustments of the standard liquor Brix that is needed for maximum utilization of the pan heating surface.

In most evaporator automatic control schemes the aim is to withdraw a specified uniform thick juice from the last effect. In linking the scheme here described to a fully automatic evaporator, the logical step is to make standard liquor Brix the controlled

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condition. This allows the melter to be reduced to minimum size and eliminates high surge tanks. Centrifugaling rates become more uniform by extension of automatic timing of individual centrifugals and timed intersequential operation of centrifugal groups; pan demands on evaporator vapors are leveled out by maximum flow controllers on the main vapor lines, decreasing tendency for thick juice to flu te rapidly.

■

By-Products

New Idea for Utilizing Spent Molasses-Distillery Wash As Fertilizer

SHIH-CHUNG WANG and KAI-YUAN GIO, *Report* Taiwan Sugar Experiment Station No. 13, pp 1-11 (Dec. 1956), English summary.

Spent wash is the residual liquid obtained by distilling fermented molasses in the manufacture of alcohol. As it comes from the still this liquid has a Brix of 8-12, and contains 0,11 to 0,28% of nitrogen, 0,5 to 0,14% of P205, and 0, 3 to 0,9% of K_2O, depending on the quality of the cane that is run through the grinding mills. Disposal of this product has always been a problem. Health authorities object to its discharge into public water courses. If the factory is located near a large irrigation canal it may be transported to the cane fields, where considerable benefit could be derived from its content of fertilizing materials, but such situations are rare. In some cases it is concentrated to a thick syrup and hauled to the fields in tanks, but this is economically impracticable for longer distances.

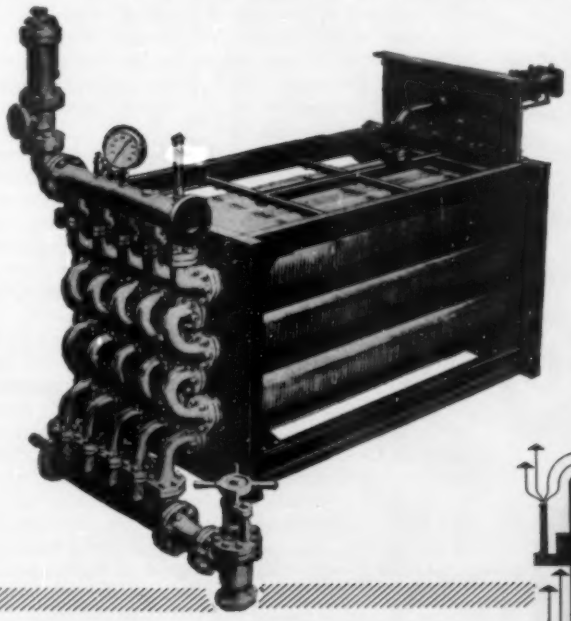
The method worked out by the Taiwan Experiment Station in Formosa is to concentrate the wash in an evaporator heated by exhaust steam from the sugar factory, and returning the vapor from this evaporator into the third cane juice evaporator. Generation of steam required to concentrate the spent wash to about 60 Brix requires the equivalent of about 170 kilograms of bagasse fuel per metric ton of concentrated wash. After cooling gaseous ammonia is passed into the thickened wash, whereby its nitrogen content is increased to any favorable level, the highest obtained being 24%. The product, which now contains about 25% of total nitrogen, 7.2% of K_2O and about 6% of organic matter, is a high grade fertilizing material and can therefore be transported considerable distances at a cost no greater than for a solid fertilizer of a comparable grade. It is not a complete fertilizer, as its content of P_2O_5 is low, and phosphate in solid form would be needed. Field tests with this material gave the expected results.

■

Current Technology of Sugar-Base Detergents

Zeitschrift F. Zuckerindustrie, Vol. 6 (81) p. 492, 1956.

A compilation of recent publications in the chemical industry press gives the following outline of the production of detergents and other products from sugar. The reactions involved are relatively simple. Using dimethylformamid or dimethyesulfoxyd as a solvent, three molecules of sucrose are brought together with one molecule of methylester (for example methyl stearate derived from a fat such as tallow), in the presence of 0.1 molecule of potassium carbonate as the esterfying catalyst. The mixture is maintained at a temperature of about 90°C. under a vacuum of 80-100 mm. of mercury. The methyl-alcohol constituent of the fatty esters is displaced by sucrose. During the first two hours of the reaction the displaced methyl group is expelled in the form of methyl alcohol, leaving a mixture of mono- and diesters consisting of sucrose combined with the fatty acid radicals.



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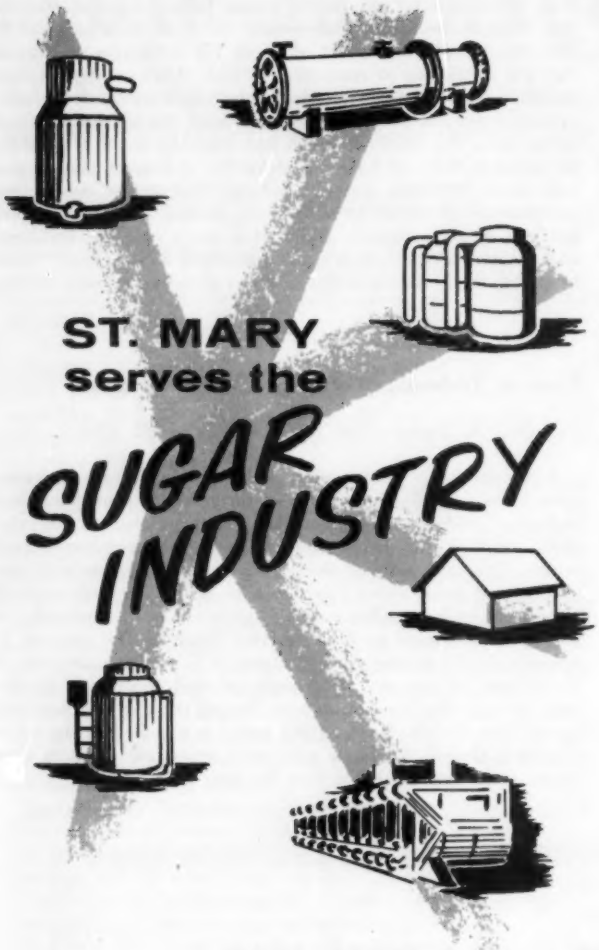

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The reaction is continued for another two hours; during this time the sucrose-diesters are completely transformed into monoesters. After the solvent has been distilled off the solid residue consists only of a mixture of the sucrose-fatty acid combination and the excess of sucrose. As is now well known this product has excellent detergent properties superior to those of ordinary soap and can be made and sold at no more than the same price.

Besides for production of a new kind of soap the same process can be used to convert sucrose into diesters instead of monoesters by employing different proportions of sucrose and fatty-acid methylesters. A diester obtained by recating one molecule of sucrose with two molecules of fatty-acid methyle-ester has good emulsifying properties, is odorless and tasteless, and therefore does not affect the aroma and other properties of pharmacy products, cosmetics such as tooth pastes, mouth washes and lipstick to which they supply a velvety feel. They can also be used as softeners for baker's bread, as anti-caking agents, anti-foam preparations, as emulsifiers in the margarine industry, and for rehydrating dehydrated foods. They can also be used directly as food in those cases where a sweet taste is not desired but sugar should be supplied.

Other types of sugar esters have been found useful as drying oils, water soluble rubber, protective coatings and plastic materials. These further uses of sugar should have considerable economic importance.

■

Sugar Beet Agriculture

Control of Leafhoppers by Systemic Poisons

ORIN A. HILLS, and associates, *Journal*, American Society Sugar Beet Technologists, Vol. 9, No. 2, pp. 125-128 (1956).

In the last few years several systemic insecticides have been successfully used in the war against insects. These insecticides, when applied to the soil or sprayed on the leaves, enter the circulatory system of the plant, causing the plant's juices to be toxic to certain insects. Among the best known of these systemic poisons is Dementon, which is the principal constituent of a commercial preparation called "Systox," and certain products of the American Cyanamid Co.

The problem of control of leafhoppers, which are carriers of the sugar-beet curly-leaf disease virus, is of importance in the production of sugar beet seed in Arizona, where the seed is planted in August or September. At this time leafhoppers are still more or less abundant and ready to attack the emerging seedlings, which are more susceptible to curly top than larger plants. Control by spraying or dusting with DDT is difficult because the young leaves do not have sufficient leaf area to hold the insecticide.

Good control of the leafhoppers was obtained by applying the active ingredients to the soil at the rate of ten lbs. per acre. In greehouse tests with Dementon and two preparations made by the American Cyanamid Co. (3911 and 12008) the control was 100%, against only 20% when no treatment was applied. The American Cyanamid preparations were the most effective because their protective action was longer (more than 20 days). For field operations it is more convenient and less expensive to mix the seed with the insecticides at a rate not exceeding 0.25 lb. per 15 lbs. of seed. Experience so far obtained indicates that it is possible to obtain economic control of leafhoppers on seedling beets at least to protect them through the 4-leaf stage. Whether further control is needed remains to be determined. (It is worth noting that Systox has been successfully used to protect sugar beets against the insect carriers of the yellows-virus disease of beets in Germany. The value of the principle of systemic poisoning has been demonstrated in India, where addition of small amounts of BHC to the soil was found to kill sugar cane borers. Ed.)

Sugar Cane Agriculture

Rapid and Equitable Distribution of Planters' Final Molasses

TEOPHILO ANCHETA, *Proceedings*, Philippine Sugar Technologists, 1956.

When a cane grower is credited for the molasses as well as the sugar produced from his cane, his share in the profit from this by-product is unusually computed on one or another of the following bases: (1) The cane milled; (2) The sugar produced; (3) The Brix extraction; (4) Purities of the crusher juice and of the final molasses; and (5) The pol-Brix and non-sugar of the crusher juice. The first four of these bases are more or less inequitable in that the furnishers of clean, good quality cane are penalized in favor of growers who deliver inferior cane; when the fifth base which is herein recommended is used this inequity is corrected, because the true measure of molasses production is given by the quantity of non sugars in the crusher juice.

Method 5 is applied as follows: The total weight (tons) of all cane ground and total tons or gallons of all molasses produced by the factory in a given period (say one week) are ascertained from the mill records. The total tons of Brix (B) and total tons of non-sugars (Ns) are calculated from the data given by the daily analysis of the crusher juice. Then B-Ns=F; F is the factor of distribution. For example, if total tons of Brix is 370.00 and tons of pol is 318.96, total tons of Ns=51.04. Suppose now that during a given week the total gallonage of molasses is 8640; this figure divided by 51.04 gives 169.279. Then, if the crusher juice analysis of the cane delivered by a grower shows B=22.00 and Ns=20.68 his share of the week's molasses will be 169.279 (22.00-20.68)= 233 gal.

This method does not involve estimation of the theoretical amount of final molasses due each planter, as it is designed solely for the equitable and rapid distribution of the actual waste molasses produced, which may be of any consistency or quality for any period of distribution. Neither is it necessary to record the actual amounts of non-sugars due each planter. Using a Freiden automatic calculating machine, the necessary computation can easily be made in a minimum of time.

■

Loss of Activity of 2,4-D

A. G. BARRIE, *Cane Growers Quarterly Bulletin*, Vol. 20, No. 2, pp. 39-41 (1956).

When 2,4-D is sprayed on the soil as a pre-emergence herbicide, its effect is gradually lost and weeds begin to grow; this loss of activity is due to a number of factors; normally, when the solution is sprayed on the soil some of the 2,4-D is absorbed by the soil particles, on which it forms a fine film. If this absorbed 2,4-D is present in sufficient quantity it is capable of preventing the germination of weeds. The unabsorbed 2,4-D is not thus fixed, and rain may wash it down to lower depths especially on light sandy soils.

This removal of 2,4-D from the upper levels may have two consequences; first, the concentration may be lowered in the upper levels and weed growth is more likely; secondly, 2,4-D in the lower levels may have a detrimental effect on the cane roots, especially if excessive amounts have been added just before the advent of wet weather. Also, evidence is at hand to show that some kinds of soil microorganisms may cause the decomposition of 2,4-D on heavily fertilized soils containing little or no humus; when 2,4-D is applied to such a soil it may be very rapidly inactivated.

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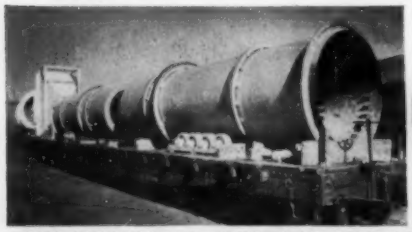

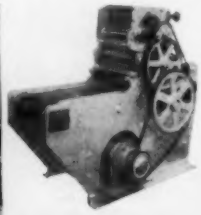

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Agricultural Labor Requirements for Sugar Production in Areas Supplying the U. S. Market

U. S. Dept. of Agriculture Sugar Reports No. 41 (1955).

Man-days of labor and money cost of cane and beet sugar in various areas are shown in the accompanyiny table. These figures speak for themselves, but their significance is to be sought in the social and economic conditions of the various regions. The relatively low labor costs of 100 lbs. of sugar in Hawaii, Florida, and the beet area are due to relatively scare agricultural labor in these countries, which the producing companies have had to more than counterbalance by extraordinary progress in mechanizing all phases of field work. In Louisiana the cost of production is relatively high on account of climatic conditions which keep acre yields at relatively low levels in spite of mechanization. In Puerto Rico mechanization is not emphasized on account of an excessive labor supply in an overpopulated island.

Costs of Producing Sugar, 1954 Crop

	Hawaii	*Florida*	*Louisiana*	*Beet Area*	*Puerto Rico*
Man-days per acre	26.38	14.78	18.64	9.83	41.20
Man-days per ton of cane	.30	.45	.82	.61	1.39
Man-days per ton of sugar	2.63	4.31	9.63	4.20	12.56
Ave. prevailing wages ..	$ 10.98	$ 7.67	$ 4.61	$ 7.71	$ 3.54
Money cost of labor per acre	$289.65	$113.36	$85.93	$75.79	$145.84
Money cost of labor per T/C	$ 3.29	$ 3.45	$ 3.78	$ 4.70	$ 4.92
Money cost of labor per T/S	$ 28.91	$ 33.06	$44.29	$32.38	$ 44.46
Money cost of labor per 100 lbs. sugar	$ 1.45	$ 1.65	$ 2.21	$ 1.62	$ 2.22

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360 CFM Vacuum 14 x 8 Oliver
364 CFM Vacuum 14 x 6 Ingersoll ER
434 CFM Vacuum 14 x 7 Worthington HB
464 CFM 100 PSI 12 x 11 Ingersoll ESI
676 CFM 100 PSI 15—9¼ x 12 Ingersoll XRB
1040 CFM 100 PSI 18—11 x 14 Chicago OCE
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Johns-Manville Expansion Program

Johns-Manville will expand its Dutch Brand Division plant in Chicago by approximately 50 percent, which will provide more than 250 new jobs, it was announced today by Earl F. Boyle, vice-president and general manager. The project, which will be completed in early 1958, will involve construction of a new manufacturing building with brick finish, installation of new machinery and equipment, and modernization of existing buildings.

The Johns-Manville Dutch Brand plant expansion at Chicago is part of the Company's overall expansion program which includes construction of two new plants for manufacturing Transite asbestos-cement pipe at Stockton, Calif., and Dension, Texas; construction of two new plants for manufacturing insulating board at North Bay, Ontario, and Klamath Falls, Ore.; construction of a floor tile plant at Marrero, La.; construction of a hardboard plant at Natchez, Miss., and construction of an asphalt roofing products plant at Savannah, Ga.

■

More Sugar in Food

Food processors are becoming increasingly aware that a substantial amount of sucrose added to their products makes them more flavorsome and enhances their natural taste, according to Dr. Henry B. Hass, president of the Sugar Research Foundation. Dr. Hass made these disclosures to a group of 100 friends and guests of the Sugar Club of New York at its meeting on November 7.

He made these observations after a series of visits to research institutions and Foundation projects throughout the country. It has become clear, he stated, that—people like more sugar in their ice cream, canned peaches become peachier with the addition of substantial quantities of cane or beet sugar, and the alcoholic content of wine can be enhanced most effectively by the addition of sugar. He noted that California law prohibits putting sugar in wine, but the evidence on the value of doing this should give ammunition to those attempting to alter this legislation.

In his informal talk, Dr. Hass also mentioned that one of the projects sponsored by the Foundation has been successful in making plastics from white sugar and he predicted that in a few years substantial amounts amounts of sugar would be used for this purpose.

Medición de Claridad en Filtración

Por Paul W. Leppla, *Director Técnico*

La eficacia en filtración suele medirse en términos de velocidad de corrida y claridad. La velocidad de corrida se mide fácilmente en la mayoría de fábricas; pero la medición de claridad implica los aspectos más difíciles de la técnica de filtración. Por consiguiente, la mayoría de industrias dependen de la evaluación visual de la claridad del filtrado, lo que es solamente cuantitativo a lo sumo, y a veces puramente subjetivo.

La evaluación crítica de la claridad del filtrado requiere instrumentos de medición. Hay disponibles varios instrumentos de fabricación norteamericana bastante buenos. Algunos miden la luz transmitida, cuya técnica es discutible, ya que pocos de estos instrumentos hacen distinción entre el blanqueo de color soluble y la remoción de partículas en suspensión. La medición de *Tyndall* o luz difusa es mucho más aceptable.

El problema de normas absolutas tampoco se ha resuelto todavía, lo que da lugar a confusiones en la medición de claridad entre laboratorios. Un fabricante de instrumentos tiene disponibles varios calibradores que alegan ser estables, y una sociedad de técnicos por lo menos está tratando de perfeccionar normas de referencia absolutas para que puedan obtener mediciones idénticas en diferentes laboratorios.

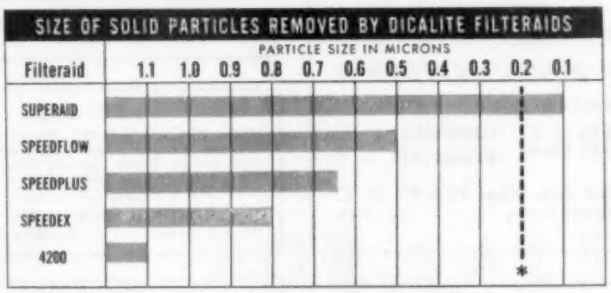
Bajo tales circunstancias, la evaluación de una serie de auxiliares filtrantes de diatomita es sumamente difícil. Mientras que el auxiliar filtrante "A" puede tener el 90% de la eficacia clarificante del auxiliar filtrante "B" en una solución de azúcar crudo, la clasificación relativa en un sistema de pectina puede ser solamente el 60%. Además, la eficacia clarificante relativa de dos auxiliares filtrantes con respecto al mismo líquido puede cambiar marcadamente según las condiciones del ensayo.

Debida a las variantes implicadas que pueden afectar los resultados en alto grado, es imperioso que los ensayos comparativos dupliquen hasta donde sea posible las condiciones reales de la fábrica. Como esto a menudo se hace difícil, muchas fábricas dependen del caudal de experiencia a su disposición de parte de un importante surtidor en este ramo sumamente complejo—experiencia que abarca muchos tipos de licores, filtros y condiciones de operación.

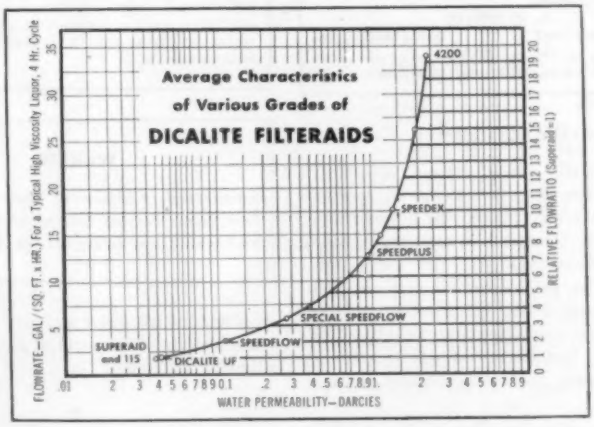
El gráfico a la derecha ilustra un importante paso de avance en este ramo tan difícil, recientemente logrado en el laboratorio de Dicalite. Aunque es posible calcular el tamaño promedio de los poros de tortas de filtro, nuestros científicos saben desde hace tiempo que los auxiliares filtrantes de diatomita retienen fácilmente partículas mucho más pequeñas que el diámetro calculado para los poros de torta de filtro. Preparando cuidadosamente suspensiones de partículas de tamaño uniforme en la escala de 1-10 micrones, y ejecutando ensayos de filtración en el laboratorio bajo condiciones perfectamente reguladas, pudieron determinar exactamente el tamaño de partículas que se pueden remover con cada grado de auxiliar filtrante Dicalite.

LOS AUXILIARES DICALITE le permiten "tender redes" para "pescar peces" de todos tamaños

Desde luego, ha yuna diferencia fundamental entre la pesca y la filtración . . . pues en la filtración, a usted no le interesa el "pescado" sino el "filtrado." Con todo y ello, para "pescar" usted necesita una "red" adecuada . . . por lo cual Dicalite le ofrece gran diversidad de auxiliares filtrantes de alta calidad para un fin análogo. El gráfico a continuación muestra (1) el tamaño de las partículas atrapadas por distintos grados de Dicalite y (2) las velocidades de corrida que pueden esperarse de estos grados en trabajos de filtración ordinarios. Este gráfico le indica claramente el Auxiliar Filtrante Dicalite que debe proporcionar el mejor equilibrio entre la claridad y la velocidad de corrida en sus trabajos de filtración.



*0.2 MICRON—Theoretical limit of resolution of optical microscope. Few microscopes achieve it.
80.0 MICRONS—Smallest particle size visible to the unaided eye at 10" distance.



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Por Delfín Suerte
Victorias Mill District Planters' Assn.

Bajo el punto de vista del ingeniero azucarero, la caña puede considerarse como un cilindro hueco, donde las paredes están formadas por la corteza y el interior se compone de una estructura celular blanda llamada "parénquima." La extracción de la sacarosa se logra desfibrando y desintegrando los tejidos de la caña; no obstante, la perfecta extracción del jugo se hace posible solamente cuando la desintegración del tejido de la caña se lleva al punto máximo hasta romper las células que contienen el jugo (Tromp, 1936). Las repetidas compresiones entre las mazas de la desmenuzadora y de los molinos producen tal desintegración, pero los aumentos en las capacidades de molienda y el número limitado de mazas en el tren de molienda imponen un límite a la desintegración, lo que trajo como resultado lógico la introducción de un sistema de preparación económico que permite utilizar al máximo la capacidad compresora de las mazas en trabajos de extracción. Esto explica el rápido aumento en el uso de cuchillas de caña, desmenuzadoras múltiples, desfibradoras, y combinaciones de estos auxiliares de molienda.

Bajo el punto de vista fabril, la caña puede considerarse en términos de fibra y jugo. Hay cañas tan duras como el bambú, como la variedad Uba, y otras que son quebradizas, como la variedad Alunan. Ambos tipos de caña crean dificultades en los trabajos de molienda, reduciendo la capacidad del tren y el coeficiente de extracción.

Cuando el por ciento de fibra es sumamente alto, fácilmente puede ejercer un marcado efecto sobre la extracción; es decir que cuanto mayor es el contenido de fibra menor es el coeficiente de extracción para el mismo coeficiente de molienda (Spencer and Meade, 1944). En Louisiana, el contenido de fibra en la caña aumentó de 10 a 15 por ciento durante los últimos quince años debido a cambios de variedades de caña. Como consecuencia de lo anterior, Dauber (1938) demostró que el coeficiente promedio de extracción descendió de 93 por ciento con cañas de bajo contenido de fibra a 89 por ciento con cañas con 16 por ciento de fibra. Esto fué subsiguientemente confirmado por Tromp. No obstante, los resultados recientemente obtenidos en Filipinas con cañas con un contenido de fibra moderado fueron diferentes.

Como el coeficiente de extracción es adversamente afectado por el contenido de fibra excesivo, Noel Deerr sugirió que todos los coeficientes de extracción para fines de comparación fuesen corregidos a un contenido de fibra de 12.5 por ciento (extracción reducida), cuya práctica fué adoptada por la Sociedad Internacional de Tecnólogos en Caña de Azúcar en 1935.

De lo anterior se desprende que los ingenieros y tecnólogos azucareros están generalmente de acuerdo en que el coeficiente de extracción varía inversamente con el contenido de fibra en la caña. A pesar de ello, los trabajos de molienda en el Central Victorias (Filipinas) revelaron que en el caso de cañas de bajo contenido de fibra, comúnmente cañas de bajo contenido de fibra, comúnmente llamadas cañas blandas, la polarización y humedad del bagazo ascienden y la presión en las calderas desciende, lo que reduce el coeficiente de extracción. Esto lo vemos confirmado por las cifras promedias dadas en la Tabla 1 que indica los resultados de cuatro años de pruebas de molienda con cañas de diferentes variedades.

De modo que la extracción de sacarosa varía directamente con el contenido de fibra en la caña independientemente del contenido de sacarosa. Tres variedades (H37-1933, POJ 2878 y POJ 2883) con altos contenidos de fibra acusaron un coeficiente de extracción mayor de 93 por ciento, mientras que las otras dos variedades (Alunan y POJ 3016) de bajo contenido de fibra acusaron una extracción de 92 por ciento. El contenido de sacarosa en todas estas variedades es casi igual.

Para verificar los datos anteriores, el autor tomó de los informes diarios de la fábrica los resultados de análisis de bagazo consignados en la Tabla 2 correspondientes a los meses de marzo, abril y mayo de la campaña actual.

Por la tabla anterior vemos que las cañas de alto contenido de fibra (llamadas cañas duras) tienen menos polarización y humedad que las de bajo contenido de humedad (llamadas cañas blandas). Esto explica el más alto coeficiente de extracción acusado por las primeras en los ensayos a que nos referimos. Además, el valor térmico del bagazo varía directamente con el por ciento de fibra e inversamente con el contenido de humedad, tal como se supone.

La experiencia ha demostrado que cuando se muelen cañas de las variedades Alunan o POJ 3016, la presión del vapor baja, debido al alto contenido de humedad en el bagazo y a la mayor cantidad de bagacillo alimentados al hogar de la caldera. Los análisis de coladuras revelaron que las cañas blandas producen más bagacillo que las cañas duras, como puede verse por la Table 3.

Con la idea de conocer los resultados de molienda en otras fábricas, el autor reunió los datos de cuatro fábricas, todas con equipo de molienda del mismo tamaño, pero moliendo cañas de diferentes variedes—dos, cañas blandas y dos, cañas duras. En la Tabla 4, tomada del Sinopsis Anual de Datos de Molienda correspondientes a la campaña de 1953-54, se indican los ajustes de los molinos y resultados obtenidos con distintas variedades.

Por la tabla anterior vemos que las dos primeras fábricas obtuvieron menor extracción que las dos siguientes, moliendo cañas duras, no obstante el hecho que el contenido de sacarosa en las cañas molidas por las primeras era más alto que en el caso de las segundas. Además, las fábricas que molieron cañas de bajo contenido de fibra tenían mayor abertura entre las mazas de entrada que las que molieron cañas de alto contenido de fibra. El ajuste más abierto se hizo para evitar frecuentes atascamientos.

Vemos, pues, que en la práctica, nuestras fábricas obtienen menor extracción de cañas de bajo ocntenido de fibra que de cañas de alto contenido de fibra, cuyos resul-

Tabla 1. Resultados de Cuatro Años de Molienda

Variedad	*Fibra*	*Sacarosa*	*Humedad Bagazo*	*Pol. Bagazo*	*Extracción*
H37-1933	13.86	12.253	46.06	2.78	93.56
POJ 2878	14.54	12.219	46.52	2.58	93.64
Alunan	10.16	12.160	53.31	3.97	91.81
POJ 3016	11.14	12.672	51.23	3.86	91.91
POJ 2883	11.73	12.119	49.67	2.87	93.91

Tabla 2. Bagazo de Diversas Variedades de Caña

Variedad	*Polarización*	*Humedad*	*U. T. Británicas*
H37-1933	2.71	47.10	4529
CP29-116	2.74	47.70	4234
POJ 2883	3.14	50.30	4326
Alunan	3.67	52.88	3831
POJ 3016	3.53	51.63	3961

Tabla 3. Bagacillo Tamaño Malla #6

Variedad	*Por Ciento*
H37-1933	17.990
POJ 2883	18.020
Alunan	21.720
POJ	22.720

Trabajo presentado en la Junta de 1956 de Tecnólogos Azucareros de Filipinas.

tados son directamente contrarios a los anunciados por varios tecnólogos azucareros para otros países.

El autor supone que los ingenieros de fábricas locales habrán experimentado dificultades en la molienda de cañas de las variedades Alunan, Badilla y POJ 3016. Ellos saben que la presión en las calderas baja cuando muelen estas variedades en fuertes cantidades a la vez. También observan frecuentes atascamientos de los molinos, pero no se dan cuenta de que el coeficiente de extracción baja tan pronto como se muelen estas cañas y vuelve a aumentar tan pronto como se muelen cañas duras. Ellos no disponen de datos cuantitativos para demostrar que (en un período de 24 horas, por ejemplo) la polarización y humedad de cañas blandas son más altas que las de cañas duras. En la mayoría de fábricas, los datos de análisis de bagazo no hacen distinción entre variedades, o sea que éstas no son analizadas por separado. De modo que no hay forma de determinar los resultados de molienda que se obtienen de las distintas variedades de caña. Pero en el Central Victorias siempre se anota la variedad de bagazo como parte del informe diario de la fábrica, lo que permite observar con fácilidad cada hora los mayores valores de polarización y humedad en cañas de bajo contenido de fibra indicados en la Tabla 2. Se sugiere que las demás fábricas de azúcar sigan la misma práctica para determinar los resultados de molienda de las distintas variedades de caña en cada distrito. Si las observaciones en el Central Victorias son confirmadas por otras fábricas, *tal vez sea necesario cambiar o modificar la fórmula de extracción reducida dada en nuestros Métrodos de Regulación Química recientemente aprobados para su adopción.*

¿Cuáles son los factores que contribuyen a estos resultados contrarios? El autor ha llegado a la conclusión de que los bajos coeficientes de extracción de las llamadas cañas blandas se deben a las causas siguientes: a) Naturaleza de las células y reacción del bagazo a la compresión; b) relativamente mayor por ciento de bagacillo; y c) retención de humedad.

a. *Naturaleza de las células y reacción del bagazo a la compresión.* Si examinamos una muestra de bagazo en el microscópico, veremos que contiene gran número de burbujas de aire. Este aire ocupa el lugar del jugo extraído por los molinos. Tan pronto como el bagazo sale de la maza bagacera, todas las células rotas y aplastadas por los molinos vuelven a tomar casi su forma original debido a la elasticidad natural de las fibras. Según las células rotas pierden la mayor parte de su contenido, absorben el aire circundante a medida que vuelven a su forma. Se supone que cuando el líquido de imbibición viene en contacto con el bagazo, se introduce en él y se mezcla perfectamente con el jugo remanente en el bagazo. Pero esto casi nunca se logra completamente por dos razones: (1) nunca se rompen todas las células completamente, por lo que no son susceptibles a la imbibición, y (2) la mayor parte de las células rotas están llenas de aire, de modo que el jugo se encuentra solamente en los pequeños intersticios entre la superficie de las burbujas de aire y pared de las células. En tales circunstancias, se produce muchísima energía superficial, por lo que se necesita mucho tiempo para la difusión y mezcla del líquido de imbibición con el jugo remanente en el bagazo. Siguiendo esta teoría, Khainovsky concibió un ingenioso método para determinar este arrastre de aire y la cantidad de azúcar removido al cabo de cada evacuación por medios de extracción neumáticos.

b. *Bagazo pulverizado o bagacillo.* La experiencia demuestra que cuando la desintegración de la caña se lleva más allá de cierto punto, las partículas de fibra son molidas a tal extremo que después de pasar por el penúltimo molino salen hechas casi polvo (Maxwell, 1932). Esto ha sido confirmado por el análisis de coladuras de jugos de diversas variedades de caña en el Central Victorias. Gran parte de esta pulverización se debe a la naturaleza quebradiza de las cañas. En tales condiciones, el bagazo se asemeja a aserrín mojado, lo que presenta grandes dificultades de alimentación y extracción. Las dificultades de alimentación tal vez puedan vencerse, pero la extracción es seriamente menoscabada por la naturaleza pastosa del colchón de bagazo. En vista de lo anterior, la preparación preliminar de la caña, aunque resulta indispensable en sistemas de molienda modernos, no debe ser llevada más allá de cierto límite. No es la intensidad sino la calidad lo que vale en la faena de desfibrado. Las briznas deben mantener más o menos su forma, pero disminuyendo en tamaño según prosigue la molienda, de cuyo modo se obtiene un material adecuado para mantener el ritmo de molienda y facilitar la extracción del jugo sin llevar la desintegración a un punto exagerado.

c. *Retención de humedad.* Como el bagazo reacciona a la compresión a modo de esponja, vemos que distintas variedades de caña exhiben distintas capacidades de retención de agua. Cuando el bagazo se muele demasiado fino, esta masa a modo de aserrín se aloja en las ranuras de las mazas, lo que reduce la eficiencia de los molinos. Su naturaleza pastosa ofrece menos resistencia a la presión de las mazas, como puede verse por el alto contenido de humedad en cañas de las variedades Alunan y POJ 3016, las que acusan mayor por ciento de bagacillo en los análisis de coladuras.

Resumen

Hemos visto cómo las cañas de bajo contenido fibroso, como la Lunan y la POJ 3016, afectan adversamente la extracción de sacarosa, cuya reacción es contraria a la generalmente observada por ingenieros y tecnólogos azucareros en otros países. Se deduce, pues, que la baja extracción se debe a los siguientes factores: (a) Naturaleza de las células y reacción del bagazo a la compresión, según la teoría de Khainovsky, que se verificará la próxima campaña; (b) más bagacillo en cañas quebradizas, como Alunan y POJ 3016, como se confirmó en análisis de coladuras; y (d) retención de agua, como se observó en análisis de bagazo.

Sobre el particular, sugerimos que otras fábricas estudíen la reacción de cañas de bajo contenido fibroso mediante pruebas de molienda y análisis de bagazo en sus correspondientes localidades. Si esta característica resulta ser general en fábricas de Filipinas, entonces será necesario modificar la fórmula de extracción reducida en nuestro Manual de Regulación Química.

El autor desea expresar su agradecimiento a la Victorias Milling Company por haberlo autorizado a usar en algunas tablas datos tomados de su laboratorio.

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Tabla 4. Ajuste de Molinos y Variedades Molidas—Campaña 1953-54

	Primer Molino		*Segundo Molino*		*Tercer Molino*		*Cuarto Molino*	
Fábrica	*Entrada*	*Salida*	*Entrada*	*Salida*	*Entrada*	*Salida*	*Entrada*	*Salida*
Haw-Phil.	3-7/16"	1-3/4"	2-7/8"	1-1/4"	3"	13/16"	2-11/16"	1/4"
Maao	1-7/8"	3/4"	1-3/8"	9/16"	1-3/8"	9/16"	7/8"	3/16"
S. Carlos	1-1/16"	3/16"	11/16"	3/4"	11/16"	13/16"	9/16"	1/16"
Victorias	7/8"	5/8"	3/4"	1/2"	5/8"	1/4"	3/8"	

Fábrica	*Variedad*	*Fibra*	*Sacarosa*	*Extracción*
Haw-Phil.	Alunan, POJ 3016	10.83	13.45	92.24
Maao	Alunan, POJ 3016	11.51	13.68	92.19
S. Carlos	H37-1933	12.59	12.74	93.36
Victorias	H37-1933, POJ 3016	12.14	12.03	92.86

Informe Sobre la Industria Fidjiana

Por Roy J. Leffingwell
Director de Relaciones Públicas, Hawaiian Sugar Planters' Association

FIDJI tiene un mercado potencial para 204,000 toneladas cortas de azúcar. Sin embargo, en 1955, cuando alcanzó su más alta producción por segunda vez, sólo produjo 180,000 toneladas cortas de azúcar.

Para 1956 se esperaba una producción de 198,000 toneladas cortas, cuyas esperanzas fueron desvanecidas por los ciclones que comenzaron en enero y dejaron caer más de 100 pulgadas de lluvia (más del doble de la lluvia promedia) en las principales regiones cañeras durante el primer trimestre del año. En muchas partes, las siembras de caña permanecieron inundadas tanto tiempo y las pérdidas fueron tan grandes que la producción calculada para este año no pasa de 163,000 toneladas cortas.

La Colonial Sugar Refining Co. Ltd., fundada en Australia en 1855, comenzó a producir azúcar en Fidji en 1880, apenas seis años después de que la Isla de Fidji fué aceptada como una colonia del Imperio Británico. Se había tratado anteriormente de iniciar la producción de azúcar comercial, pero todos esos esfuerzos fracasaron.

Actualmente, las cinco fábricas de azúcar en Fidji son propiedad de la Colonial. Cuatro de ellas están situadas en la isla mayor de Viti Levu, y la otra en la isla de Vanua Levu. El Ingenio Lautoka tiene una capacidad alrededor de 99,000 toneladas cortas de azúcar al año, y es una de las fábricas de azúcar más grande en el Hemisferio Austral.

En 1916, al terminar la migración de indios a Fidji, la Colonial parceló sus plantaciones más grandes y arrendó la tierra a colonos individuales a precios bajos en lotes de 10 a 12 acres. La empresa se quedó aproximadamente con el 3 por ciento de esas tierras mayormente para fines experimentales y trabajos de entrenamiento.

A la fecha, la Colonial continúa prestando ayuda económica a algunos agricultores, y mantiene un cuerpo de expertos de campo para colaborar con los colonos, quienes reciben instrucciones y consejo sobre métodos de cultivo, avenamiento, nuevas variedades de caña, época de recolección, etc. Como resultado de la repartición de las plantaciones entre colonos independientes, hoy día Fidjii cuenta con 12,000 productores de caña que trabajan unos 110,000 acres de tierra.

El rendimiento de caña en estas islas es relativamente alto, el cual oscila entre 23 y 28 toneladas por acre. Aproximadamente el 85 por ciento se corta sin quemar.

Se necesitan unas 7½ toneladas de caña para producir una tonelada de azúcar. Lo normal es una cosecha de retoño. No obstante, los colonos están dejando a un lado las cañas nobles y en su lugar están sembrando variedades híbridas propagadas por la Colonial, de modo que en el futuro se espera poder producir mayor número de cosechas de retoño.

La producción de caña en Fidjii tal vez se pueda aumentar el 25 por ciento en tierra aún por explotar, pero de momento no se está haciendo esfuerzo alguno por lograrlo.

La temperatura en la vertiente árida de las cordilleras de Fidjii oscila entre 54 y 96 grados. La lluvia media en la vertiente seca es alrededor de 75 pulgadas al año y en la húmeda 120 pulgadas. No se emplea el riego.

En las fincas de Fidjii se encuentra poco equipo mecánico. Aunque se emplean algunos tractores en trabajos de cultivo, éstos son realizados mayormente por fuerza animal.

La mayor parte de la producción de caña es transportada por líneas férreas de la Colonial. La caña transportada por camión no pasa del 15 por ciento de la producción total. Gran parte de la caña es portada a grandes distancias, el recorrido más largo siendo de 81 millas.

La Colonial posee 400 millas de vía férrea permanente en las islas Fidji y 160 millas de vía portátil, y emplea 57 locomotoras para arrastrar 6,400 vagones de caña. Emplea, además, 64 barcazas de 50 toneladas de capacidad cada una para caña, 15 chalanas par azúcar, 10 barcazas para miel final, y 13 lanchas a vapor y a motor diesel.

El gobierno de Fidji depende de la Colonial paar la construcción de carreteras, las que generalmente utilizan los puentes de ferrocarril para no tener que construir sus propios puentes. La Colonial mantiene un servicio de pasajeros gratuito sobre sus líneas, el cual representa el único medio de transporte para colonos y sus familias.

Desde un principio, la Colonial ha animado a los fidjianos a tomar parte en la industria azucarera. Desde 1938, la empresa viene operando fincas especiales de entrenamiento para jóvenes fidjianos en 400 acres de su mejor tierra en Drasa, cerca de Lautoka. Estos muchachos reciben instrucción sobre el cultivo de la caña y todos los aspectos relacionados con su producción, industria lechera, cuidado de los animales, y el cultivo de cosechas de productos nativos. Este programa dura tres años, el cual es totalmente costeado por la empresa. El gobierno de Fidji ayuda a escoger los jóvenes que han de recibir este entrenamiento, y ayuda a establecerlos en tierras adecuadas después de que terminan su curso.

De todas las industrias de Fidji, la azucarera es la más importante, de la que dependen unas 40,000 personas para su existencia. La Colonial también tiene una industria ganadera en Fidji, la que consta de unas 3,000 cabezas de ganado. Su ganado lechero contribuye enormemente al suministro de leche fresca para las islas.

Hace varios años que la Colonial Sugar Refining Company, conjuntamente con la Estación Experimental de la Asociación de Productores de Azúcar de Hawaii, en Lautoka, Fidji, vienen prosiguiendo un programa de investigaciones relacionadas con las enfermedades de Fidji y "Downey Mildew," ambas de las cuales se encuentran en Fidji. Ninguna de ellas ha llegado a Hawaii. Entre otras cosas, se está estudiando la susceptibilidad de cañas comunes de Hawaii a estas enfermedades.

D. R. Strong, técnico de campos en jefe, y Nigel Montieth, agrónomo de la Colonial Sugar Refining Co., examinando una parcela afectada por la enfermedad de Fidji.

El Consumo de Azúcar en Aumento

Por Albert Viton

EL CONSUMO mundial de azúcar centrífuga ha aumentado más durantes los últimos ocho años que en el curso de cuarenta años previos a la Segunda Guerra Mundial. En 1956, el consumo de azúcar (con excepción de la China) ascendió a 41 libras por persona, valor crudo, cuya cifra representa 32 por ciento o diez libras más por persona que en 1934-38. El consumo mundial (exclusive de la China) llegó a 39.2 millones de toneladas métricas, o casi dos tercios (67 por ciento) más que en 1934-38, cuando el consumo mundial fué de 23.5 millones de toneladas. El consumo total de azúcar de otros tipos continúa siendo aproximadamente el mismo que antes de la última guerra, lo que significa, desde luego, un descenso por persona. Pero tal descenso es insignificante comparado con el ascenso en el consumo de azúcar blanco. En efecto, el consumo de azúcar durante los últimos diez años ascendió mucho más que el de cualquier otro alimento principal.

Además, y contrario a la mayoría de pronósticos, el rítmo de aumento en consumo no ha disminuído. Desde 1949, cuando el descenso en el consumo de azúcar registrado después de los años de guerra volvió a los niveles de consumo en 1934-38, dicho consumo viene ascendiendo a razón de 3.3 por ciento cada año. En 1954, el consumo de azúcar fué 4 por ciento mayor que en 1953, y en 1955 fué 3.0 por ciento mayor que el año anterior. El ascenso en 1956 probablemente se aproximó a 3.3 por ciento. En contraste, el promedio anual de aumento en consumo durante los años de 1920-39 fué 1.5 por ciento.

Desde luego, el ritmo de aumento en consumo no fué igual en todos los continentes ni en todos los países, de modo que el asunto debe ser estudiado más de cerca. Inmediatamente después de la guerra, el mayor aumento en consumo ocurrió en los países hispanoamericanos. En 1949, la prosperidad económica resultante de los precios de exportación más elevados y del aumento en producción permitió aumentar casi el 50 por ciento el consumo de azúcar por persona. Mientras tanto, el azúcar disponible en otros contientes por persona continuaba 5-20 por ciento por debajo de los niveles previos a la guerra. No obstante, el ritmo de aumento en consumo en los países hispanoamericanos ha disminuído considerablemente desde entonces. En 1955, tal consumo fué sólo 15-20 mayor que en 1949. Conviene observar que en los diez años de 1946 a 1954, hispanoamerica se convirtió en un fuerte consumidor de azúcar por primera vez en su historia. Su consumo promedio de 63 libras por persona en 1955 (contra 37 libras antes de la guerra) es considerablemente mayor que el consumo promedio de 55 libras en Europa occidental en los años 1934-38.

Desde 1949, fué en el Cercano Oriente, África y Asia donde se registraron los mayores aumentos en consumo de azúcar. Hasta entonces, el consumo en Asia continuaba alrededor de 20 por ciento por debajo de los niveles de 1934-38, en tanto que en otras regiones sólo se habían logrado pequeños aumentos. Pero desde principios de la presente década, el consumo por persona en los países del Cercano Oriente y África aumentó alrededor del 50 por ciento. Comparado con el consumo previo a la guerra, cada persona en estas vastas regiones consumió en 1956 más de doble cantidad de azúcar. Desde luego, el consumo global aumentó todavía más—190 por ciento, y se espera que continúe aumentando a no ser que ocurra un desplome económico mundial. En vez del consumo actual de tres millones de toneladas (1.1 millones en 1934-38), estas regiones pronto absorberán de 4.5 a 5 millones de toneladas, si el azúcar se puede obtener a los precios de 1955-56.

Proporcionalmente, el ritmo de aumento en consumo en Asia desde 1951 figura entre los más altos del mundo, no obstante el hecho que esta región partió de un nivel de consumo muy bajo. Debido a la destrucción durante la guerra y al desorden después de la guerra, aún en 1951 el consumo por persona en Asia no pasaba de 90 por ciento del previo a la guerra, cuando el consumo en el resto del mundo ya era considerablemente mayor que antes de la guerra. Sin embargo, el consumo en Asia ascendió el 50 por ciento desde entonces. Lo anterior nos lleva a la conclusión de que puede anticiparse un marcado aumento en consumo en el futuro en esta región. Muchos países están emprendiendo nuevos y más extensos programas de desarrollo económico, lo que indudablemente estimulará nuevos aumentos en la demanda de azúcar blanco.

Cabe suponer, lógicamente, que un aumento en el consumo de azúcar en estos países pobres y de poco desarrollo, donde los niveles de consumo de alimentos y azúcar figuraban entre los más bajos, reflejarían un aumento en ingresos. De modo que es interesante observar que un aumento en ingreso en países de bajo ingreso parece tener mayor efecto en el consumo de azúcar que de otros alimentos importantes, como productos lácteos, carnes, etc. Este es un punto que merece un detenido estudio por los gobiernos y productores de alimentos. Y mientras que hoy día el 90-95 por ciento del azúcar se consume en el hogar, es probable que a medida que los países pasen del nivel de consumo de 50-60 libras por persona al año se registre un aumento gradual en el consumo de azúcar en industrias de productos elaborados, como confitería y repostería, bebidas gaseosas, helados, frutas en conserva, productos de panadería, etc.

En el otro extremo de la balanza de ingreso y consumo tenemos a América del Norte y a Oceanía. En estas regiones, que han tenido el más alto consumo en el mundo, no se ha registrado un marcado aumento en el consumo de azúcar por persona, no obstante que los ingresos aumentaron considerablemente y que el precio "real" del azúcar con relación a otros alimentos—y desde luego, con relación al ingreso—ha bajado. Estimo que la evidencia parece justificar la conclusión que la cantidad de azúcar de una u otra forma que una persona puede consumir tiene un límite. Yo fijaría este límite en 100-125 libras por persona, según el gusto, posición social, costumbres dietéticas y culturales, etc. En Estados Unidos, las cifras globales indican que el consumo de azúcar se ha estabilizado alrededor de 104 libras por

Tabla 1. Consumo Mundial de Azúcar Centrífuga
(en millones de tons. métricas, valor crudo)

Región	Preguerra	1951	1954	1955 (Prel.)	1956 (Calc.)
Europa Occidental	6.9	8.0	8.8	9.3	9.7
América de Norte	6.5	7.7	8.2	8.4	8.6
América Central	0.6	1.3	1.4	1.5	1.6
América del Sur	1.4	3.0	3.5	3.6	3.8
Cercano Oriente	0.3	0.6	0.8	0.8	0.9
Asia†	2.9	3.2	4.8	5.0	5.3
África	0.8	1.7	2.1	2.2	2.3
Oceanía	0.5	0.6	0.6	0.7	0.7
Total	19.9	26.1	30.2	31.5	32.9
Europe Oriental, Unión Soviética y China	4.4	4.4	6.2	6.5	6.9
Total Mundial	24.3	30.5	36.4	38.0	39.8

† Exclusive de China.

Calderas C-E para la primera fábrica de tabla dura de bagazo en Cuba

Para fines de 1957, la Cía. Cubana Primadera, S. A. iniciará sus operaciones como la primera empresa en Cuba dedicada a la producción de tabla dura de bagazo . . . la que está adquiriendo cada día más aceptación como material de construcción.

Esta fábrica empleará un sistema nuevo para separar el parénquima del bagazo, lo que permite producir tabla de gran resistencia sin emplear ligas artificiales.

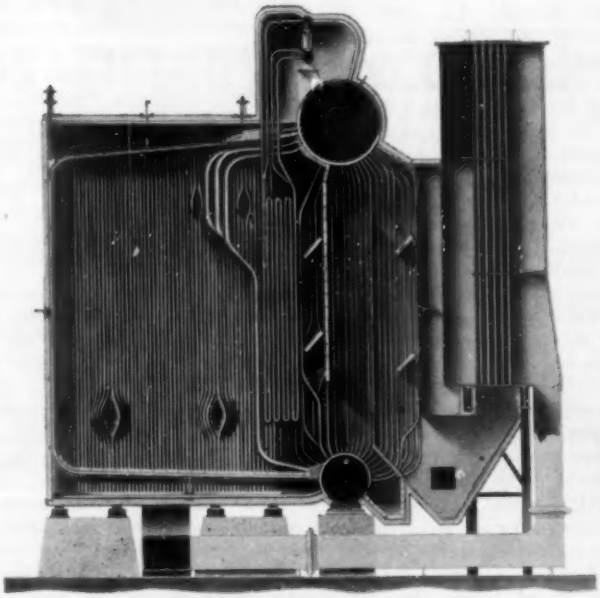
En la nueva fábrica, vapor para fuerza y procesos de elaboración será suministrado por dos Calderas C-E Tipo VU-55, diseñadas y construídas por la Combustion Engineering. Este tipo de caldera fue diseñado expresamente para quemar petróleo o gas, y para generar de 50,000 a 120,000 libras de vapor por hora. Sus principales detalles de diseño son el sistema de combustión tangencial y los tubos de hogar en tangente, lo que hace este tipo de caldera sumamente eficiente y flexible. El montaje de los paneles de tubos de las paredesi y algunos otros tubos del hogar de la caldera ahorra tiempo y dinero en manejo, transporte y montaje en la planta. La cubierta fabricada para mantener presión en el hogar evita la necesidad de emplear sopladores de tiro inducido.

Si usted está interesado en la producción de papel, cartón o furfural a base de bagazo, en quemar bagazo para producir vapor, o en cualquier equipo para generar vapor o quemar combustible, nos será grato colaborar con usted, sus ingenieros o sus consultores. Sus consultas dirigidas a nuestro Departamento de Exportación en Nueva York serán atendidas prontamente.

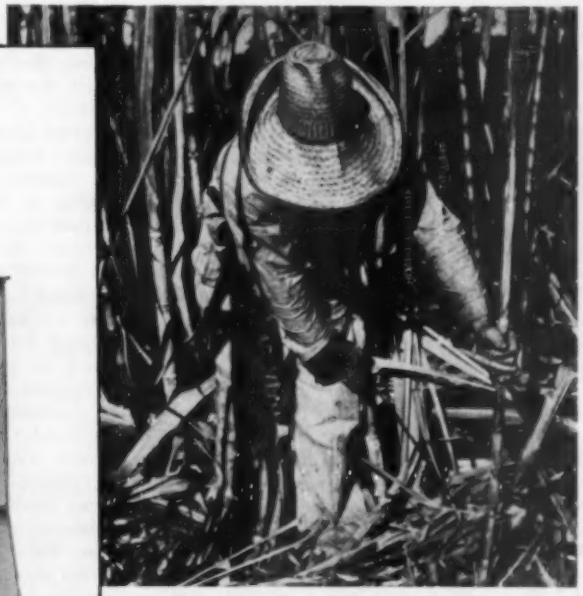
B-950A

ESPECIFICACIONES:

Tamaño — Cinco tamaños desde 50,000 hasta 120,000 lbs. de vapor por hora.
Presión — de 250 a 750 lbs./pulg. cuad. (todos tamaños).
Temperatura — la que se necesite hasta 750 F.
Combustible — petróleo o gas, quemados a presión.
Recuperación de calor — Tubular o por precalentador de aire regenerativo.



Caldera C-E Vertical, Tipo VU-55



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persona, pero estas cifras pueden conducir a conclusiones erróneas, ya que el alto número de nacimientos en años recientes ha aumentado en alto grado el por ciento de niños menores de 12 años que normalmente consumen menos azúcar que los adultos. El consumo por adultos ha aumentado, pero no mucho. Tampoco cabe anticipar un aumento significante en el futuro, a no ser que ocurra un cambio en el punto de vista y hábitos de alimentación.

Europa se encuentra entre los países de bajo ingreso y consumo, por una parte, y América del Norte y Oceanía, por otra parte. Previo a la guerra, el consumo de azúcar en Europa Occidental era alrededor de 55 libras por persona—comparado con 100 libras en Estado Unidos y Oceanía, y menos de 20 libras en el resto del mundo. Pero durante la guerra, el acopio de azúcar, así como de otros alimentos, disminuyó; aún en 1949, el consumo de azúcar en Europa era 5-10 por ciento menor que antes de la guerra. Hace varios años leí un estudio del consumo de azúcar en Europa, partiendo del cual se llegaba a la conclusión que los aumentos futuros serían pequeños y se limitarían solamente a la parte meridional del continente. No obstante, los acontecimientos no siguen en todo caso las "leyes" y conclusiones dictadas hasta por el más sabio. Para 1955, el consumo promedio en Europa Occidental había aumentado casi un quinto (17 por ciento) sobre el promedio previo a la guerra. El consumo total había aumentado 35 por ciento, de 6.9 a 9.3 millones de toneladas. Aunque la participación de Europa Occidental en el consumo total mundial ha disminuído progresivamente desde principios del siglo, todavía consume una cuarta parta de la producción mundial de azúcar centrífuga. (América del Norte consume 22 por ciento; Europa Oriental alrededor de 15 por ciento. Estas dos regiones, con 30 por ciento de la población mundial, consumen casi dos tercios del consumo total mundial.)

En cuanto a la Union Soviética, las estadísticas disponibles indican que el consumo de azúcar ha aumentado desde un promedio de 28 libras por persona antes de la guerra hasta 42 libras en 1955, o sea el 50 por ciento. Se supone que el consumo total haya aumentado de 3.7 a 6.0 millones de toneladas. Sin embargo, nuestra información sobre las condiciones en Europa Oriental deja mucho que desear. Estoy seguro de que los datos estadísticos que se han hecho públicos exageran el grado de aumento en consumo verdaderamente registrado.

Volviendo a Europa Occidental, tal como cabía esperar, fué en los países en la parte meridional del contiente, que antes de la guerra tenían el ingreso y consumo más bajos, donde se registró el mayor aumento en el consumo de azúcar. El hecho es que, aunque estos países tienen vino, gran variedad de frutas, y mucho sol, el consumo de azúcar no aumentó en relación con disminución alguna en el acopio de vino, frutas o sol, sino en relación con el aumento en ingresos y con los cambios en los precios del azúcar (en relación con otros alimentos). Un buen ejemplo de cómo el consumo de azúcar reacciona a los cambios en las condiciones económicas lo tenemos en Italia. En años recientes, ese país ha gozando de un alto grado de prosperidad, la que vemos reflejada en el aumento de 112 por ciento en el consumo por persona. Dicho consumo aumentó de 17.5 libras en 1934-38 a 37 libras en 1955, y probablemente ascenderá a 40 libras en 1956. Un punto notable es que el mayor aumento en Italia parece haber ocurrido en la parte meridional, que es la más pobre y la más desdeñada de todo el país, y la que tenía el menor consumo de azúcar previo a 1939. El consumo de azúcar también aumentó notablemente en Portugal (50 por ciento) y en Yugoslavia (100 por cien). Por razones que no son difíciles de comprender, el nivel de consumo en Grecia y España previo a la guerra no fué recobrado hasta 1954-55. En 1949, el consumo en Grecia por persona era sólo el 82 por ciento del previo a la guerra, mientras que en España era escasamente más de la mitad del promedio de 1934-38.

Tabla 2. Consumo de Azúcar Centrífuga por Persona (en kilogramos)

Región	Preguerra	1951	1954	1955 (Prel.)	1956 (Calc.)
Europa Occidental	25.2	26.3	28.5	29.6	30.7
América del Norte	46.3	45.5	46.5	47.0	47.0
América Central	16.6	24.7	25.6	26.7	27.5
América del Sur	16.9	26.3	28.2	29.5	29.8
Cercano Oriente	5.9	9.5	11.2	12.3	13.4
Asia†	4.5	4.2	6.1	6.2	6.5
África	5.3	8.7	9.9	10.4	10.8
Oceanía	45.0	51.7	47.2	47.3	48.0
Promedio	14.3	15.7	17.3	17.8	18.4

† Exclusive de China.

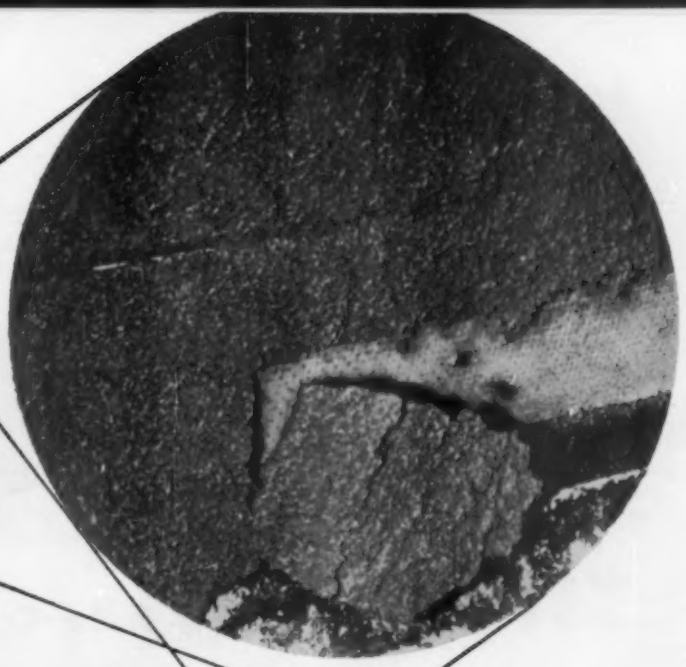
En cuanto a los países que ya antes de la guerra consumían 100 a 120 libras de azúcar por persona (Dinamarca, Suecia y el Reino Unido), apenas ha ocurrido cambio alguno. En el Reino Unido se registró un pequeño aumento—significativamente y casi totalmente en industrias de productos elaborados y en establecimientos de alimentos listos para servir. En la mayoría de los demás países europeos, el consumo por persona antes de la guerra era 60-65 libras, en los cuales se han registrado aumentos de 15-30 por ciento, principalmente desde 1950. Tales aumentos probablemente son mayores que los que se habían pronosticado pocos años atrás.

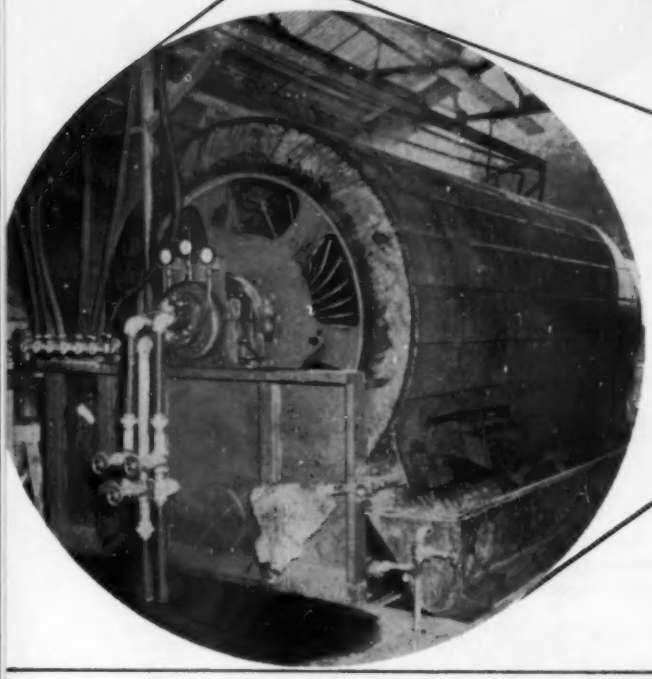
Por lo general, cuantas más industrias y población urbana tenga un país, mayor será el consumo indirecto a través de productos elaborados, en relación con el consumo directo en el hogar. De igual modo, cuanto más alto sea el consumo total de azúcar, mayor será la proporción consumida en forma de productos elaborados. Por otra parte, cuanto más alto sea el ingreso por persona y el nivel de vida, mayor será la proporción de azúcar consumido en forma de productos elaborados. Pero, entre estas generalizaciones hay excepciones, y un estudio de las razones y explicación de los diversos hábitos nacionales de consumo, organizaciones sociales y familiares y sus normas, gustos para distintos alimentos, etc. resultarían sumamente complicados. De modo que aquí sólo podemos referirnos a los puntos básicos.

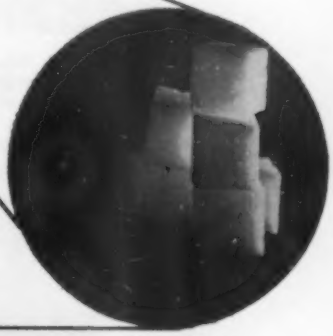
¿Cómo se pueden explicar las diferencias en los aumentos de consumo durante la última década? La tabla a continuación indica el consumo en 27 países antes de la guerra, en 1951, en 1955 y en 1956. Ahora, ¿cómo se explica el aumento promedio de 900 por ciento en consumo en el Congo Belga, Haití, Angola y África Ecuatorial Francesca, y solamente el 10 por ciento en Thailandia (Siam), Ceilán, Portugal y España?

Una respuesta completa implicaría un estudio de las organizaciones sociales, niveles de adelanto agrícola y tecnológico, tradiciones culturales, normas alimenticias, y factores económicos. Pero yo me ocuparé solamente de las fuerzas e influencias económicas. Creo que se puede demostrar una marcada e íntima relación entre el consumo y el precio "real" del azúcar. Cuanto más bajo es el costo "real", con relación al de otros productos alimenticios y al ingreso, mayor es el consumo de azúcar.

Además, los efectos de cambios en precio o ingreso varían en relación con los niveles de estos factores. En otras palabras, cuanto más bajo sea el ingreso, mayor será el efecto sobre el consumo producido por aumentos en precio o disminución en ingreso, y vice versa. De igual modo, cuanto más alto sea el precio, mayor será el efecto sobre el consumo producido por aumentos en precio o disminución en ingreso. Sin embargo, los efectos de cambios económicos no son idéntiticos en todos los países con igual escala de precio y de ingreso. Cada país o grupo de países de normas culturales, sociales y económicas similares tiene que ser examinado sepa-







LOS FILTROS EIMCO DAN MEJORES RESULTADOS

Con los Filtros Eimco para Cachaza usted obtiene mayor beneficio de su inversión por las economías resultantes de (1) menos trabajo, (2) elementos anticorrosivos, (3) azúcar recuperado de la cachaza, (4) menor pérdida de miel en la torta, y (5) menos repasos debido a filtrados de más alta pureza.

He aquí varias ventajas de los Filtros Eimco comparados con filtros-prensas:

FILTROS EIMCO		FILTROS DE PLACAS Y CUADROS
Ciclos cortos (de 3 a 9 minutos); menos inversión de sacarosa y menos reabsorción de impurezas.	INVERSION	**Ciclos largos (de 2 a 4 horas); más inversión de sacarosa y más absorción de impurezas.**
Se necesita menos agua por pie cuadrado de superficie filtrante para lavar la torta y reducir su contenido de sacarosa al mínimo.	LAVADO	**La torta contiene 5 veces más sacarosa y se necesita más agua de lavado por hora por pie cuadrado de superficie filtrante.**
Menos inversión y disolución de no-azúcares, lo que se traduce en filtrados de más alta pureza.	PUREZA DEL FILTRADO	**Más inversión y disolución de no-azúcares, lo que causa bajas en pureza.**
Estaciones de filtros limpias. Se eliminan por completo las pérdidas por fugas, derrames y lavado de los paños de filtro. Fucionamiento continuo.	EFICIENCIA FUNCIONAL	**Considerable derrame de cachaza por filtrar cuando se abre el filtro o limpia el medio filtrante.**
Raramente necesita reparación durante la campaña. Elemento filtrante de metal, permanente. Menos trabajo (un operario parte del tiempo).	CONSERVACION Y REPARACIONES	**Mayores costos anuales de conservación y reparación. Implican más trabajo (dos operarios todo el turno).**
La torta es perfectamente lavada para eliminar su odor característico desagradable. Se maneja fácilmente y se puede almacenar o aplicar a los terrenos como abono. Su uniformidad permite calcular la recuperación de sacarosa con exactitud.	TORTA DE FILTRO	**Odor sumamente desagradable. La torta frecuentemente se deshace por soler ser más blanda por dentro que por fuera, lo que dificulta su manejo e impide determinar las pérdidas de sacarosa con exactitud.**

Nos será grato enviarle un formulario por el cual usted podrá calcular con fácilidad los factores que intervienen en la recuperación de sacarosa en cachazas.

Usted se convencerá de las ventajas de modernizar su fábrica de azúcar con Filtros Eimco para Cachaza.

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B-230

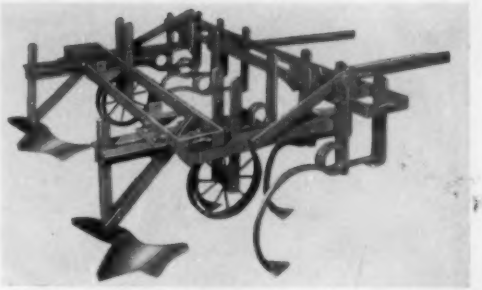
Tractor Allis-Chalmers WD-45 especialmente dotado por la Thomson para ofrecer el alto despejo de 30 pulgs. que necesitan los aperos de cañaveral, como esta cultivadora de discos. El tractor se ofrece con motor a gasolina, alcohol, gas licuado de petróleo, o diesel.

THOMSON-A la Cabeza en Equipo Que Se Adapta a Sus Canaverales

Hace años que los robustos aperos Thomson de labranza vienen sentando la norma en los cañaverales del mundo. Estas herramientas tienen la resistencia, la altura o despejo y la adaptabilidad que se necesitan en toda región productora de caña. Son el resultado del continuo avance y especialización en la adaptación de equipo mecánico moderno a la producción de caña de azúcar.

La montura del portaherramientas Thomson hidráulico, por ejemplo, ofrece gran resistencia, alto despejo y gran diversidad de ajustes para todo su surtido de aperos para el laboreo de la tierra y el abonamiento y cultivo de la caña. El portaherramientas se adapta para los tractores de cañaveral Allis-Chalmers WD-45 y Thomson XTD de 4 ruedas motrices o los Modelos UC y UCD.

Thomson—con más de 30 años de experiencia—es el mayor fabricante de equipo de cañaveral en el mundo. Solicite folletos e información detallada.



Rompedora de Centros para doble portaherramientas Thomson hidráulicos. Los dientes flexibles o de resorte en la barra delantera laborean completamente dos centros a la vez. Las ruedas graduadoras regulan la profundidad con exactitud.

THOMSON

MACHINERY CO., INC.
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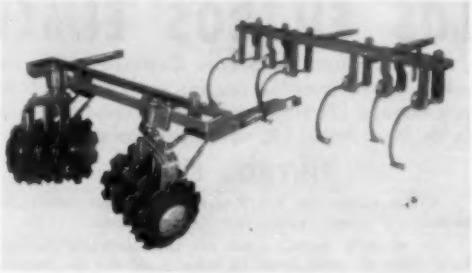


La Cultivadora de Dientes Flexibles se usa con la secció delantera del portaherramientas Thomson. Los dientes están dispuestos para ofrecer plena altura sobre el camellón de caña. La sección trasera, provista de discos, se puede agregar para caña nueva.

El Tractor Thomson de 4 Ruedas Motrices tiene un motor diesel marca General Motors y pesa 5,416 kg. (12,000 lbs.). Los frenos, mecanismo de dirección y potente levantaherramientas son todos accionados hidráulicamente. Este tractor Modelo XTD fué diseñado para el doble portaherramientas Thomson y los aperos correspondientes, así como para las Cargadoras Thomson 'Hurrycane'.

Cosechadora mecánica de caña, instalada en un tractor diésel Allis-Chalmers de carriles, trabajando en una plantación del Brasil. Este implemento corta y desmocha la caña y la deposita en hileras.

Maquinaria moderna para que la producción de caña de azúcar resulte más lucrativa

A grandes pasos avanza la mecanización del cultivo de la caña de azúcar. En algunas regiones se emplean máquinas en todas las fases de la producción, desde la siembra hasta la cosecha, habiéndoso eliminado casi por completo el trabajo manual.

En las ilustraciones se ven tres tractores Allis-Chalmers, que han merecido buena acogida entre los que cultivan caña de azúcar en muchas partes del mundo. Todos ellos han sido proyectados para emplear en combinación con accesorios especiales, de gobierno por mecanismo hidráulico, para la manipulación de la caña.

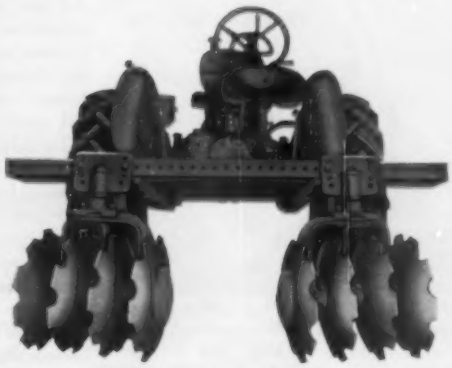
Con el empleo de estos implementos, se reducen considerablemente el tiempo y la mano de obra requeridos para el trabajo en los cañaverales. Así, la cosechadora de caña (arriba) ha dado excelentes resultados en las plantaciones tropicales, pudiendo recolectar hasta 160 toneladas por hectárea. Con el cargador (abajo, derecha), un hombre puede cargar de 50 a 75 toneladas de caña por hora.

La Allis-Chalmers fabrica tractores de ruedas y de carriles, para el trabajo en los cañaverales. Su robusta construcción los hace ideales para dicho trabajo, pues resisten perfectamente los choques y esfuerzos a que están sujetos los tractores en estas labores, y son útiles para la labranza, cosecha, acarreo y otras faenas propias del cultivo de la caña de azúcar.

Para obtener más informes, comuníquese con el distribuidor de maquinaria agrícola Allis-Chalmers en su país.

ALLIS-CHALMERS, DEPARTAMENTO DE EXPORTACION MA157
DIVISION DE TRACTORES, MILWAUKEE 1, E.U.A.

Los implementos que se ven instalados en tractores Allis-Chalmers son fabricados y distribuidos por la Thomson Machinery Co., Thibodaux, La., E.U.A.



Tractor Allis-Chalmers WD-45 con una rastra de discos integral para el cultivo de la caña.

El Tractor Allis-Chalmers HD-6 con cargador de caña, recoge la caña de la hilera para ponerla en carros o camiones.

ALLIS-CHALMERS

FABRICANTES DE MAQUINARIA DESDE 1847

radamente para determinar las leyes que gobiernan la relación entre el consumo y el precio e ingreso. Sin embargo, para el mundo entero, un aumento de 10 por ciento en ingreso se considera equivalente a un aumento de 5 por ciento en el consumo de azúcar, mientras que una baja de 10 por ciento en precio se considera equivalente a un aumento de 4 por ciento en consumo.

La mayor parte del aumento en consumo se debe al gran aumento en ingresos registrado después de la Segunda Guerra Mundial, especialmente en los países tradicionalmente pobres y atrasados de hispanoamérica, el Cercano Oriente y África. La combinación de mejores precios sobre los productos exportados, ya sean metales y minerales o productos agrícolas, el ingreso e inversión de capital extranjero en el país, y los programas de fomento industrial y otros ha aumentado el ingreso por persona en estos países el 50 por ciento o más en años recientes. En Asia, por otra parte, los desajustes políticos y económicos después de la guerra impidieron su desarrollo económico. En efecto, hace muchos años que Asia viene sufriendo un decaimiento en sus actividades económicas e ingresos, acompañado de un descenso en el consumo de azúcar. Esa situación no había cambiado en Asia hasta hace 2 o 3 años, y en algunos países todavía no se ha logrado cambio alguno.

Table 3. Consumo por Persona en 27 Países (en kilogramos†)

País	1934-38	1951	1956
Francia	25	27	30
Grecia	11	10	11
Italia	8	14	18
Portugal	10	14	16
España	12	8	13
Reino Unido	49	41	54
Costa Rica	14	25	30
República Dominicana	10	20	21
Haití	1.5	7	11
México	15	25	30
Argentina	30	35	37
Brasil	16	29	32
Irak	11	18	26
Jordán	8	12	22
Turquía	5	8	12
Birmania	2.4	1.3	2.6
Ceilán	14	18	17
Pakistán	3	2.3	2.3
Siam (Thailandia)	4	2.5	3
Angola	0.5	4	5
Conga Belga	0.1	1.3	2.4
África Ecuatorial Francesa	0.2	1.5	2.4
Costa del Oro	1.8	4	7
África Oriental Inglesa	2.0	6	8
Nigeria	0.4	4.4	1.6
Sudán	4	8	13
Australia	51	59	54

† Consumo hasta 3 kg. se da con un decimal; de esta cifra para arriba se da en el entero más aproximado.

Es curioso observar que las diferencias de precios entre distintos países son tan grandes como las diferencias en consumo. De los 102 países, acerca de los cuales he recogido datos sobre los precios de azúcar al detalle, los precios en 19 de ellos en 1954 eran menos de 7 centavos norteamericanos por libra, y en 35 países entre 7 y 10 centavos. Por otra parte, en 3 países, el precio al detalle oscilaba entre 10 y 15 centavos, mientras que en otros 18 países, la libra de azúcar costaba más de 15 centavos. En algunos países, la libra de azúcar cuesta hasta 25 centavos norteamericanos. En fin, en la mitad de los países, la libra de azúcar al detalle se vendía a menos de 10 centavos, y en la otra mitad a precios más elevados.

Son muchos los factores que explican estas diferencias en los precios del azúcar al detalle, como la protección de productos nacionales de alto precio, impuestos para aumentar las rentas públicas, diversos impuestos locales para fines especiales, y una política encaminada a reducir el consumo de azúcar, etc. Desde luego, el azúcar no es el único artículo agrícola o industrial de producción nacional que se protege, pero no creo que exista otro alimento de consumo diario objeto de tantas regulaciones administrativas y presión social y política. De los 130 países, cuyos regímenes azucareros he examinado, no más del 10 por ciento, a lo sumo, pueden considerse exentos de regulaciones e impuestos sobre el azúcar. En algunos países, los derechos de importación e impuestos locales representan de 35 a 50 por ciento del precio del azúcar al detalle.

La variación de precios en cada país explica en gran parte las diferencias en consumo de azúcar, ya sea directamente en el hogar o en forma de productos elaborados. Desde luego, el precio en metálico no lo dice todo. Ese mismo precio en metálico tiene cierto significado donde representa el 20 por ciento del ingreso promedio diario de una persona, y otro significado completamente distinto en otro país donde no representa más que el 2 por ciento de ese ingreso. Desgraciadamente ocurre que los precios corrientes del azúcar en metálico suelen ser más altos en los países de bajo ingreso que en aquellos de alto ingreso. De un modo u otro, la diferencia en los precios es verdaderamente enorme.

Una buena medida del costo "real" del azúcar es la cantidad que se puede comprar con relación al ingreso promedio. Un estudio de este punto demuestra que el ingreso promedio de una persona en Estados Unidos le permite comprar (al precio local) como veinte veces más azúcar que una persona en la República Dominicana, Haití, Nicaragua, Ecuador o Paraguay, y de 20 a 30 veces más que en la mayoría de países asiáticos, o sean 7,600 kilogramos en el primer caso contra 400 a 600 kilogramos en países de hispanoamérica y de 200 a 400 kilogramos en la mayoría de países asiáticos. En términos de ingreso, el azúcar en Estados Unidos es 15 a 20 veces más barato que en el primer grupo de países mencionados, y 20 a 30 veces más barato que en el segundo grupo.

En cuanto a Europa, los ingresos por persona en Dinamarca, Noruega, Suecia, Suiza y en el Reino Unido les permiten comprar de 4,000 a 5,500 kilogramos de azúcar al año. En otras palabras, el azúcar en esos países es de 25 a 50 por ciento más caro que Estados Unidos. Bélgica, Francia, Irlanda y Holanda corresponden al grupo medio de 2,000 a 4,000 kilogramas. Alemania, Austria y Finlandia figuran en otra categoría entre 1,600 y 1,800 kilogramas. En el resto de los países, el costo del azúcar es tan alto con relación al ingreso por persona que sólo puede comprar de 600 a 1,000 kilogramas al año.

Pero los precios del azúcar tienden a decaer, no sólo los precios "reales" sino los precios corrientes en metálico. Muchos países han podido reducir los precios durante los últimos 4-5 años, no obstante los aumentos en jornales y costos de materiales. En cuanto a los precios "reales" en relación con los ingresos o con los precios de otros artículos y servicios—cuya relación es, desde luego, importante, el descenso desde 1938 es muy notable. En Europa, la baja en los precios fue mayor en 1934-38 en seis países y menor en 10 por lo menos. En relación con los jornales, la situación actual es aún más favorable, en comparación con el período previo a la guerra.

Todo esto me lleva a la conclusión de que las perspectivas de aumento en consumo en el futuro son muy favorables. No obstante el mal acierto de la mayoría de profetas, yo me aventuro a declarar que: en el supuesto que continúe la tendencia actual en cuanto a empleo e ingresos, el consumo de azúcar probablemente seguirá aumentando entre 2.0 y 2.5 por ciento cada año. De esto, alrededor de 1.2 por ciento podrá atribuirse el aumento de población y el resto a la tendencia de ingresos y precios que parece sentirse actualmente. En otras palabras, y salvo cualquier alteración importante por razones económicas, políticas o militares, el consumo de azúcar (fuera de la Unión Soviética, la China y países de Europa Oriental) probablemente aumente de los 31.5 millones de toneladas (valor crudo) en 1955 a cerca de 40 millones de toneladas en 1965. Una idea de la magnitud del cambio que está ocurriendo la tenemos en la siguiente comparación: durante los 20 años entre las dos guerras mundiales, el consumo de azúcar fuera de los países citados aumentó alrededor de 4.5 millones de toneladas (de 15.5 a 20 millones, o el 30 por ciento), de modo que durante los 20 años después de la Segunda Guerra Mundial probablemente aumente otros 20 millones (de 20 a 40 millones de toneladas).

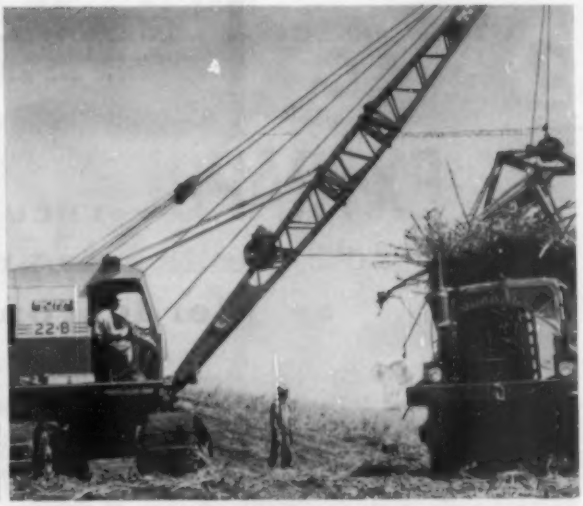
Usted Puede Cargar Su Caña RAPIDAMENTE

con una Cargadora Bucyrus-Erie 22-B para trabajos pesados

diseñada expresamente para la carga de caña

¡Carga! El arpeo agarra el máximo potencial de carga rápida y fácilmente. Ambos cables del arpeo son manipulados por una sola palanca. Todos los mandos están mecánicamente conectados para asegurar pleno dominio.

¡Viraje! La rapidez de los cables y viraje reducen el tiempo de carga. El izador del botalón es independiente de todas las demás funciones, el que se puede embragar en cualquier momento con un solo movimiento de una palanca de mano.



¡Descarga! Con la regulación del ascenso y descenso del botalón completamente mecánica, el operador puede situar la carga en posición para la descarga rápida y fácilmente. En cosa de segundos, puede virar el botalón para cargar otro lote de caña.

LA Cargadora Bucyrus-Erie 22-B está reconocida como la norma en su clase, pues se encuentran miles de ellas en servicio en todo el mundo. Esta cargadora para trabajos pesados incluye detalles de construcción que hacen las máquinas Bucyrus-Erie las exponentes de buen funcionamiento en toda clase de trabajos—más muchos detalles especiales para la carga de caña. Por ejemplo, las carrileras incluyen rodaduras tipo de tractor para poder operar con fácilidad en terrenos blandos, en arcilla resbalosa, y en cañaverales en faldas de colina empinadas. Su transmisión de dos velocidades—una baja para maniobras normales y otra alta para traslados de un cañaveral a otro—ofrece gran movilidad. La combinación de las rodaduras tipo de tractor y la transmisión de alta velocidad—ofrecidas por la Cargadora de Caña 22-B—significa que usted puede trasladar la máquina de un cañaveral a otro sin tener que portarla en un remolque.

Obtenga datos completos sobre esta máquina de alto rendimiento hoy mismo. Diríjase al distribuidor de la Bucyrus-Erie más cercano o escríbanos directamente.

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South Milwaukee, Wisconsin, E. U. A.

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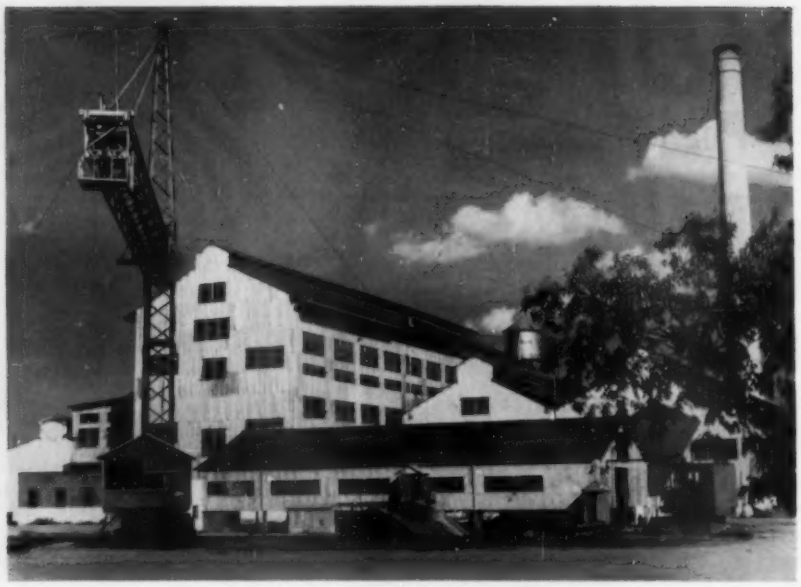
¡prueba conclusiva! hecha con EXTRAPOL en el ingenio "El Mante" en México



La foto muestra una vista parcial del ingenio "EL MANTE" en México donde se llevaron a cabo los experimentos a que se refiere este anuncio. Los datos expuestos en el texto forman parte del informe del Ing. Luis Mariscal G. al señor José Ch. Ramírez, Gerente General del ingenio.

EXTRAPOL recupera alrededor de 10% de la sacarosa que normalmente se pierde con el bagazo

En experimentos conducidos por el ingeniero Luis Mariscal G., jefe químico del ingenio "EL MANTE" en México, se determinó conclusivamente que con la aplicación de Extrapol en el agua de maceración se recupera alrededor de 10% de la sacarosa que normalmente se pierde con el bagazo.

Los experimentos en cuestión fueron de dos semanas de duración y se efectuaron exactamente bajo las mismas condiciones en moliendas del mismo volumen, aplicándose el EXTRAPOL durante la primera semana.

La cantidad de EXTRAPOL usada fué de 190 kilogramos y se recuperó 10.88% de las pérdidas de sacarosa sufridas en bagazo sin la aplicación de EXTRAPOL. Este porcentaje equivale a más de 19 toneladas de sacarosa que de otro modo se hubiesen perdido. EXTRAPOL demostró conclusivamente que las economías hechas por la recuperación de sacarosa, exceden con creces los cálculos más optimistas. Además, si la capacidad de su planta evaporadora es limitada, o si desea economizar combustible, el Extrapol la permitirá disminuir el porcentaje del agua de maceración sin aumentar sus pérdidas de azúcar. Sobre este punto, el Sr. Ing. Luis López Carsolio, Superintendente General del Ingenio "EL MANTE", dice lo siguiente: "EL EXTRAPOL también evitará el uso innecesario del agua de maceración, con la consiguiente economía de combustible en los evaporadores."

Por lo tanto, si sus pérdidas de sacarosa en el bagazo son excesivas, le convendría investigar más a fondo las posibilidades del uso de EXTRAPOL en su ingenio. EXTRAPOL significa: *menos agua . . . más azúcar . . . menos vaporización . . . MAYORES UTILIDADES.*

Le sorprenderán también la facilidad y la rapidez en la instalación del equipo para la aplicación del Extrapol.

Solicite informes pormenorizados sobre éstos y otros experimentos y sobre EXTRAPOL, a

WYANDOTTE CHEMICALS CORP.
Export Department, 2327,
WYANDOTTE, MICHIGAN, E. U. A.

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EMBARQUES MARITIMOS DESDE AQUI
MARSHALL TEXAS
NEW ORLEANS
HOUSTON
USTED ESTA CERCA DE SU FUENTE DE ABASTECIMIENTO DE CARBON ACTIVADO DARCO®
USANDO el carbón activado Darco, usted obtiene las ventajas de los costos reducidos de embarque y entrega más rápida de sus pedidos. Manufacturado en Marshall, Texas, Darco se embarca desde los Puertos del Golfo . . . puntos de conveniencia para el transporte a corta distancia a las refinerías del Caribe, la América Central y del Sur.
La alta densidad volumétrica de Darco brinda aún mayores economías, ya que un peso dado de Darco ocupa menos espacio de carga que la mayoría de los demás carbones activados.
Para obtener información completa sobre el uso de Darco en la refinación de azúcar, escriba solicitando el artículo (en Español) "Carbón Activado en la Refinación de la Caña de Azúcar."
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División de Productos Químicos
ATLAS POWDER COMPANY
WILMINGTON 99, DELAWARE, E.U.A.
ATLAS POWDER COMPANY, CANADA, LTD., BRANTFORD, CANADA

Bibliografía Azucarera

UTILIZACION DE BAGAZO
Informe oficial sobre la utilizacion del bagazo para la manufactura de tabla; incluya una lista y reseña de unas 1000 patentes. Edición de 1952.
Inglés solamente $6.20

MICROBIOLOGIA DE AZUCARES, SIROPES Y MIELES
Por William L. Owens. Un extenso estudio de la microbiologia de azúcares y sus derivados. Nueve capítulos con datos sabre microorganismos y flora en jugos de caña y remolacha, pruebas de laboratorio, deterioro, etc. De gran utilidad para técnicos azucareros. Edición 1949, 275 páginas.
Inglés solamente $5.20

AZUCAR, SU PRODUCCION, TECNICA Y USOS
Por Andrew Van Hook. Obra concisa sobre la producción, elaboración y refinación de azúcares, su técnica y usos. Edición 1949, 153 páginas.
Inglés solamente $3.45

USO EFICAZ DEL VAPOR
Por Oliver Lyle. Datos esenciales sobre el aprovechamiento, comportamiento, utilización y economización de vapor con ejemplos prácticos. Esta voluminosa obra consta de 912 páginas, 438 diagramas, 82 tablas y un índice de 26 páginas con más de 8,000 partidas. Edición 1947.
Inglés solamente $4.25

PRINCIPIOS Y PRACTICAS DE RIEGO
Por Orson W. Israelsen; 2da. edición; 405 páginas. Describe todos los sistemas de riego; explica las teorías básicas y prácticas, con especial énfasis sobre los aspectos técnicos, almacenaje del agua, su medición, conducción, bombeo y distribución, y las relaciones básicas entre el agua y los suelas. Una magnífica obra para encargados de riegos. Disponible en inglés solamente $7.20

AZUCAR DE CANA Y SU FABRICACION
Por H. C. Prinsen Geerlings. 343 páginas. Un valioso tratado por el distinguido y antiguo director de la Estación Experimental de Java.
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MANUAL DE FABRICANTES DE AZUCAR DE CAÑA Y QUIMICOS AZUCAREROS
Por Guiford L. Spencer y George P. Meade. Edición corregida y considerablemente aumentada. Esta nueva obra en un solo tomo es el tratado más reciente y completo sobre la elaboración de azúcar de caña y administración de fábricas.
Inglés solamente (8va. edición) 1945 $12.20

MANUALES AZUCAREROS, 'GILMORE'
Estos manuales contienen datos completos acerca de empresas azucareras en los países citados, sus propietarios, gerencias, personal, equipo, procedimientos fabriles, y prácticas agrícolas.
Louisiana-Florida Sugar Manual (Inglés) $10.00
Hawaiian Sugar Manual (Inglés) $10.00
Puerto Rico Sugar Manual (Inglés) $10.00
Cuban Sugar Manual (Español) $10.00

ASPECTOS ECONOMICOS DE LA PRODUCCION DE AZUCAR
Por Francis Maxwell. Un libro sobre los aspectos económicos de la industria azucarera en distintos paises.
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CRISTALIZACION DE AZUCAR DE BAJO GRADO
Por Eugene C. Gillett. Trata del manejo de azúcares de bajo grado conforme a la práctica de la California & Hawaiian Sugar Refinery. El tema es tratado bajo los puntos de vista teórico y práctico, con especial énfasis sobre la práctica. 52 grandes páginas a doble columna, con ilustraciones y diagramas. En inglés solamente. Precio $3.70

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AZUCAR
Por Geoffrey Fairrie. Una obra práctica sobre la producción y retinación de azúcar cruda de caña y azúcar de remolacha, escrita en lenguage sencillo y sin tecnicismos. Es un libro principalmente para administradores ocupados y para individuos que desean inforación exacta sobre la elaboración de azúcar. Profusamente ilustrado con vistas transversales de plantas enteras, mostrando los procesos completos y detalladamente. 233 páginas. Inglés solamente $4.20

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METODOS FISICOS Y QUIMICOS PARA EL ANALISIS DE AZUCAR
Por C. A. Browne y F. W. Zerban. Un tratado práctico y descriptivo para uso en investigaciones y en laboratorios técnicos y reguladores. 1353 páginas, con un extenso indice. Edición de 1941.
Inglés solamente $21.20

BOTANICA DE LA CAÑA DE AZUCAR
Por C. Van Dillewijn. Una reseña de los conocimientos actuales de la morfologia, anatomía y fisiologia de la caña de azúcar. Otros importantes capítulos tratan de la nutrición, agua fotosintesis y respiración. Profusamente ilustrada, incluso una extensa bibliografía. Edición de 1952; 229 páginas. En inglés solamente $6.20

FABRICACION DE AZUCAR DE CAÑA
Por F. A. López Ferrer. Segunda edición, 1948. Esta es una obra de texto particularamente aplicable a la industria azucarera de Cuba. Su Primera Parte compuesta de 17 capítulos trata de la operación de molienda, purificación del jugo y trabajos de evaporación y cristalización. Su Segunda Parte compuesta de 20 capitulos trata del análisis de laboratorio de la caña, jugos siropes, mieles finales y otros productos y materias secundarios. Incluyé numerosas tablas de referencia. Una obra muy completa.
Español solamente $7.20

ANUARIO AZUCARERO DE CUBA
Edició de 1955. Censo de la industria azucarera de Cuba y datos estadisticos nacionales e internacionales sobre producción, exportación, etc.
Español e Inglés $5.20

MAQUINARIA Y APARATOS DE INGENIO
Por F. A. López Ferrer. Segunda edición, 1949. Obra consistente de 415 páginas en 18 capitulos. Trata de los calculos empleados en operaciones de molienda, elementos de mecónica, propiedades del vapor, cumbustibles, máquinas de vapor, turbinas, condensadores, entubado, bombas, transmisión de fuerza, fricción y lubricación, equipo de molienda, clarificación y evaporación, tachos al vacio, cristalizadores, centrifugas y equipo de refinera. En español solamente $6.20

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MANUAL DE EMPRESAS AZUCARERAS
Contiene una roseña completa de la historia, propiedades, producción finanzas, etc., de las 27 empresas azucareras mós importantes del mundo, mós una breve reseña de otras 250 empresas azucareras nacionales y extranjeras. También contiene datos estadísticos sobre producción y precios de azúcar mundiales. Edición 1954-55.
Inglés solamente $3.20

CALCULO AZUCARERO
Por Senen Viego Delgado. Segunda edición corregida y aumentada. Esta nueva edición incluye gran número de operaciones de fábrica que implican cálculos técnicos o de laboratorio y simples operaciones matemáticas y que no figuran en la primera edición, la cual se encuentra ahora agotada. Un manual sumamente útil. 411 páginas.
En español solamente $10.20

MÉTODOS OFICIALES DE ANÁLISIS DE LA ASOCIACIÓN DE QUÍMICOS OFICIALES AGRICOLAS
7ma. Edición Corregida.—Publicado por la Asociación en 1950.
Todos los métodos incluídos en esta conocida obra fueron sometidos a extensos ensayos, y son los métodos oficiales en uso en todas las divisiones de la industria agricola. Esta obra es de sumo interés para aquellos quimicos encargados del análisis de suelos, fertilizantes y damás elementos. La sección dedicada al análisis de azúcares abarca todos los trabojos realizados en laboratorios de ingenio.
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MEMORIA DE LA ASOCIACION DE TECNICOS AZUCAREROS DE CUBA
Edición de 1954. XXVIII Conferencia. Incluye numerosos escritos sobre el cultivo de la caña de azúcar en Cuba, prácticas seguidas en la casa de calderas, ingeniería azucarera y utilización de productos secundarios. 315 páginas.
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CAÑA DE AZUCAR: Utilización de los Residuos de la Industria Azucarera
Por E. Antonio Vásquez. Volumen de 394 páginas en 19 capítulos. Contiene en extenso estudio sobre, productos derivados de la caña de azúcar (bagazo, cogollos, hojas y mieles finales) como lignina, papel, cartón, tabla, prensada, alcohol, levadura, etc., con valiosos datos técnicos, sistemas y procesos de fabricación. Español solamente $6.20

MÉTODOS OFICIALES DE REGULACIÓN PARA FÁBRICAS DE AZUCAR DE CAÑA
Por los Técnicos Azucareros de Hawaii—Edición de 1955. Incluye normas para la toma de muestras, análisis de laboratorio, regulación de molinos, preparación de informes, etc. Incluye, además, 47 tablas y un índice de materias.—169 páginas. En inglés solamente $15.20

MANUAL DE LA INDUSTRIA AZUCARERA DE FILIPINAS Y OTRAS
Este manual contiene todas las centrales azucareras de Filipinas, su equipo, operaciones y producción, así como la legislación de Filipinas referente al país. Edición de 1953 de 160 páginas asúcar. Tambien incluye un estudio económica del país. Edición de 1953, de 160 páginas.
Inglés solamente $10.20

SISTEMA DE CONTROL PARA FÁBRICAS DE AZÚCAR DE CAÑA
Segunda Edición Revisada en 1955. Incluye dos apéndices con datos sobre medidas y pesos en uso en diversos paises y tablas usadas por técnicos azucareros. En inglés solamente $3.00

PRINCIPIOS DE TECNOLOGIA AZUCARERA
Editado por el Dr. P. Honig. Contiene 27 capitulos, 780 páginas, 225 tablas, 162 ilustraciones y más de 1,000 referencias. Abarca las bases fisicas y cientificas de los procesos modernos de fabricación de azúcar de caña según las investigaciones más recientes. Doce distinguidos tecnólogos azucareros han colaborado en su preparación.
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CULTIVO de la CANA de AZUCAR
Por A. C. Barnes:—El Autor ofrece una reseña general del cultivo de la caña de azúcar por métodos modernos, los que ilustra con ejemplos de trabajós llevados a la prática con buenos resultidos en numerosos paises productores de caña de azúcar en todo el mundo. Presta especial atención ar programas de cultivo bien fundados para obtener el mayor provecho de la tierra y de la mano de obra. Edición 1953.
Inglés solamente $8.20

MANUAL PARA EL LABORATORIO AZUCARERO
Por Rafael Pedrosa Puertas.—Este manual de 371 páginas para laboratorios donde se habla español se divide en dos partes. PARTE I incluye instrucciones sobre la preparación de informes diarios y quincenales de las operaciones fabriles a cargo del quimco de la fabrica. PARTE 2 explica los ensayos y análisis de laboratorio generalmente practicados en laboratorios azucareros. También incluye numerosas tablas y datos útiles.
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Por Garcia y Delgado. Este es el unico libro en su clase que contiene datos completos sobre la producción de "mieles finales de alta pureza" de caña de azúcar sobrante. En español solamente. 149 páginas $6.20

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Comentarios Sobre Cristalizadores

DIRECTOR DE LA REVISTA SUGAR:

Hemos leído con mucho interés el artículo por V. E. Baikow, "Chistalizadores para Masas de Bajo Grado," publicado en SUGAR, Julio 1956, páginas 55-56 (EL MUNDO AZUCARERO, Septiembre 1956, páginas 28-29).

Aunque estamos generalmente de acuerdo con el tenor de este artículo, deseamos hacer algunas observaciones acerca del enfriamiento en los llamados cristalizadores rápidos.

1. El autor parece decididamente en favor de un régimen de enfriamiento lento después del grado. En el caso de fábricas modernas, la única objeción es que se necesitan muchos critalizadores para masas de bajo grado y que éstos ocupan mucho espacio. Y cuando se trata de ampliaciones o aumentos de capacidad, esta parte de la instalación (cristalizadores) es frecuentemente olvidada, por lo que no se puede mantener el período de retención adecuado. En muchos casos, la falta del espacio necesario impide la ampliación de la estación de cristalizadores. El resultado de todo esto es una continua concesión entre la capacidad de la fábrica y la pureza de la miel final.

2. Por otra parte, el autor también parece estar convencido de que los cristalizadores rápidos son necesarios, y en este caso menciona los cristalizadores Werkspoor.

3. A nuestro modo de ver, el autor sólo tiene en mente los cristalizadores intermitentes con enfriamiento forzado. Tales cristalizadores son fabricados por nosotros, los que están provistos de tubos de enfriamiento giratorios.

4. Mediante el sistema especial de distribución del agua, la diferencia de temperatura enter la masa y el agua de enfriamiento es prácticamente igual en todo el contenido del artesón. El período de retención usual es de 16-17 horas por templa.

5. Sin embargo, el autor no menciona el cristalizador Werkspoor rápido continuo, que fué originalmente diseñado para masas de alto grado, pero que se está usando más cada día en la cristalización de masas de bajo grado. Por lo tanto, tenemos el gusto de acompañar un ejemplar de nuestro folleto "Many years of Experience [23 years] with WS Rapid Crystallizers" (Muchos Años de Experiencia [23 años] con los Cristalizadores WS Rápidos), en el que encontrará los puntos básicos del diseño del cristalizador Werkspoor.

Conviene observar que este tipo de cristalizador rápido no fué concebido para enfriamiento *intermitente*.

6. También deseamos recordar que en los cristalizadores Werkspoor rápidos *nunca* se forma grano falso ni conglomeraciones durante ni después de la cristalización.

7. Incluyendo suficientes cristalizadores intermedios (de depósito) se puede lograr el período de retención recomendado por el

(Sigue en la Página 72)

La biblioteca del técnico azucarero no está completa sin la última edición de directorio auténtico de fabricantes de maquinaria azucarera—EL CATALOGO AZUCARERO.

Un informe como este, preparado especialmente para usted, puede ahorrarle cientos, y a veces miles de dólares en gastos de conservación innecesarios y en pérdida de producción.

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Cargador Elevado con Cubo Ajustable

EN los almacenes de azúcar crudo de la Hulett's South African Refineries, Ltd., Durban, Natal, Unión Sudafricana, se ha implantado un nuevo sistema de manejo. Previamente, el azúcar crudo a granel era llevado del almacén al departamento de elaboración por un cucharón de arrastre accionado por cables, para lo cual se necesitaba un operador del aparejo y doce trabajadores para arrimar el azúcar al aparejo, de cuyo modo se podían transbordar 30 toneladas de azúcar por hora.

Este incómodo sistema ha sido ahora reemplazado por un nuevo cargador elevado tipo Mark V Merton accionado por un motor diesel de 44 c.f. y provisto de un cubo de ¾ de yarda cúbica (.574 m^3), cuya operación sólo requiere un operador y un trabajador. El aparato es capaz de hacer de 3 a 4 viajes por minuto, y los encargados de este trabajo informan que por el nuevo sistema se están transbordando más de 60 toneladas de azúcar por hora, o sea un aumento de más de 100%, más el ahorro de 11 hombres.

El nuevo cargador elevado, fabricado por la Merton Engineering Co. Ltd., Feltham, Inglaterra, incluye varias mejoras sobre el modelo anterior Mark IV, introducido a la industria azucarera hace unos tres años. El cubo del modelo Mark V abarca todo el ancho de las ruedas delanteras del tractor, lo que evita que rueden sobre el azúcar durante la operación de carga y aumenta la eficiencia del aparejo. La profundidad de penetración del cubo se puede ajustar a cualquier altura desde dos pulgadas sobre el nivel del piso hasta cuatro pulgadas debajo de ese nivel, cambiando la posición de dos pernos.

La altura de descarga del nuevo cargador elevado es variable. Un pequeño torno o malacate operado a mano alza y baja la estructura elevada del aparato por el despliegue y retracción de los parantes telescópicos traseros, con lo cual el cubo puede ser vaciado a cualquier altura desde 6′ 11″ (mínima) hasta 11′ 2″ (máxima). El cambio de altura de descarga sólo lleva tres minutos, removiendo y reponiendo cuatro pernos.

El alcance del cubo, o sea la distancia desde su canto interior en posición de descarga hasta el extremo trasero del tractor es 3′ 5½″, a la mínima y 2′ a la máxima. De la altura mínima de descarga, la estructura elevada se puede bajar todavía más, o sea a la altura o posición de marcha, lo que le da al aparejo una altura total de 8′ 5″ y le permite pasar por debajo de obstrucciones de poca altura.

El descargador Mark V conserva los principios básicos del modelo anterior. El cubo es accionado por malacates y cables. Los malacates van montados sobre las ruedas traseras a cada lado de la cabina del operador, los que son manejados por una palanca que gobierna el embrague y freno del malacate. La transmisión de los malacates va montada al frente del motor, lo que la hace completamente independiente del embrague principal.

El aparejo acomete la pila de azúcar con el cubo en posición baja, cuyo último es tirado y llenado simultáneamente y corre sobre los rieles elevados mientras la máquina retrocede hacia la tolva del transportador. Entonces es vaciado al llegar al extremo posterior de la máquina, de donde es devuelto a los rieles elevados por dos resortes (previamente comprimidos por el propio cubo en su carrera ascendente) y de allí vuelve a la posición de carga mientras que la máquina vuelve a la pila de azúcar a repetir la operación. El cargador no tiene que girar ni desviarse; solamente corre hacia adelante y hacia atrás entre la pila de azúcar y la tolva del transportador.

El aparejo incluye un motor diesel tipo Fordson 3,610-c.c.; un embrague de 11″ de diámetro; una transmisión de seis velocidades hacia adelante y dos hacia atrás; eje transmisor semiflotante; eje delantero de pivote central, y mecanismo de dirección tipo de bola que permite virar en un radio de 17′ 6″. La transmisión del malacate es impulsada por una cadena de rodillos tipo Renold montada en el extremo delantero del cigueñal del motor.

El problema a resolver

BAGAZO: ¿Combustible o Pasta?

A MENUDO se afirma que no existen excesos de bagazo, ya que las centrales azucareras lo dedican todo a la generación de vapor. Existe, no obstante, un buen alegato para ahorrar, si no todo, al menos parte del bagazo producido por la central, para reducirlo a pasta y convertirlo en celulosa.

Aun donde no parecen existir excesos, a menudo se puede liberar suficiente bagazo para una fábric de pasta de capacidad económica. En primer lugar, tenemos que la producción potencial de vapor de centrales azucareras está sujeta a ciertas economías.

Adoptando ciertas medidas para elevar la eficiencia de las calderas y aprovechar mejor el vapor, una central azucarera debiera poder liberar de *una tercera a una cuarta parte de su bagazo para reducirlo a pasta.*

Tomando 20 toneladas de pasta (seca al aire) cada 24 horas como la capacidad económica mínima de la fábrica, la cantidad anual mínima de bagazo con 45% de humedad que se necesita se puede calcular como sigue:

	Toneladas
Semipasta para papel de envolver, bolsas de papel, etc.	20,000
Pasta blanqueada para papelos finos (de imprenta y de escribir)	28,000

Si no se pueden liberar tales cantidades mediante economías en vapor solamente, entonces conviene estudiar el empleo de otros combustibles, tomando por base lo siguiente:

Cantidades comparables de combustible para la misma cantidad de vapor.

Bagazo húmedo (45% Agua)	1.0 (Parrilla escalonada)
Aceite combustible	0.175

Estas cifras muestran que, substituyendo 1 tonelada de aceite combustible de más fácil regulación, se pueden liberar 5.7 toneladas de bagazo con 45% de humedad. Esto permite liberar suficiente bagazo para producir unas 6.000 toneladas (20 x 300 días) de pasta seca al año, quemando las siguientes cantidades de aceite combustible en lugar de bagazo:

	Toneladas
Semipasta para papel de envolver, bolsas de papel, etc.	3,500
Pasta blanqueada para papeles finos (de imprenta y de escribir)	4,900

Suponiendo que el costo del aceite combustible sea $25 la tonelada, puesto que 5.7 toneladas de bagazo con 45% de humedad equivalen a 3.14 toneladas de fibra (seca al horno), tenemos un costo de liberación de $25 ÷ 3.14 = $8 por tonelada de fibra seca. Agregando a esto un promedio de $6 la tonelada para embalaje, almacenaje y secado, digamos hasta 12% de humedad, tenemos un costo total para la fábrica de papel de $14 por tonelada de fibra seca, para que la fábrica de azúcar no pierda por la substitución de combustibles.

El problema de emplear combustibles alternativos también puede depender del suministro de combustible para la generación de vapor y fuerza en la propuesta fábrica de papel. Otro punto que debe ser estudiado detenidamente al considerar un proyecto nuevo es que el valor del bagazo para la fábrica del papel fácilmente puede superar el costo del combustible alternativo.

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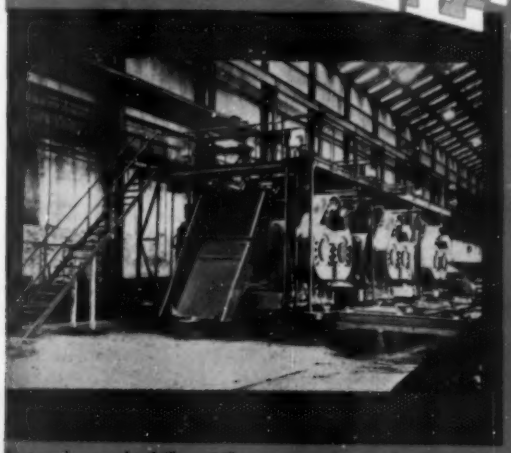
dondequiera que hay AZUCAR hay ... FLETCHER



Extensiones de 34" x 66" en una planta de molienda movida por turbina en Antigua

Plantas Completas para la Industria Azucarera

Juegos de Cuchillas de Caña — Desfibradores Maxwell — Trapiches Fletcher — Mazas de "Metal Atlas" para Trapiches — Básculas Maxwell Boulogne para Líquidos — Clarificadores Fortier — Evaporadores con Tubo de Bajada Hermético — Tachos de Paso Central — Cristalizadores Fletcher — Bombas Giratorias de Desplazamiento Tipo "Amarilla" para Mesococida y Líquidos Viscosos.

SUGAR MACHINERY

Desde luego, este no es optimismo vano, pues nuestras instalaciones de maquinaria azucarera han adquirido fama en todo el mundo azucarero por su larga duración, verdadera eficiencia y economía inigualables. Los ingenieros azucareros saben que la pericia de Fletcher en el diseño de maquinaria azucarera se debe a la íntima cooperación entre ellos y nosotros. Hace más de un siglo que venimos supliendo equipo moderno, simplemente porque nos mantenemos constantemente al tanto de los últimos adelantos. Muchísimos ingenieros manifiestan que la maquinaria Fletcher es la mejor del mundo. Nosotros sabemos que eso es cierto, y nos sentimos orgullosos de ello.

FLETCHER

TELEGRAMAS: "AMARILLA" [illegible] TELÉFONO: [illegible]

Extractos de Publicaciones Azucareras

Publicados bajo los Auspicios de la Sociedad Internacional de Tecnólogos Azucareros de Caña—Dr. O. W. Willcox, Redactor Técnico

Resistencia Térmica de Masas Cocidas

K. S. DOSS y VISHNN, *9° Congreso,* Sociedad Internacional de Tecnólogos en Caña de Azúcar, India. Trabajo S.M.15 (1956).

Para obtener el máximo agotamiento de la miel final sería conveniente enfriar la masa cocida a unos 40° C, pero esto elevaría la viscosidad de la masa cocida a tal punto que el trabajo de las centrífugas resultaría inefectivo; esto se puede evitar, recalentando la masa cocida. En la práctica, el recalentamiento se logra con elementos térmicos instalados en los cristalizadores o mezcladores, pero estos dispositivos no son satisfactorios por razones bien conocidas. Se necesita un dispositivo que no dependa de la transferencia de calor. Entre tales disposivos se encuentran varios medios eléctricos, como el calentamiento dieléctrico, por inducción y/o por resistencia. Según Doss y Vishnn, entre los tres citados, se prefiere el último. Una disposición adecuado consta de una caja rectangular con fondo piramidal truncado, en la que va suspendida una rejilla de electrodos alimentados por un inductor alterno de 220 voltios. La masa cocida se deja fluid del cristalizador a la caja rectangular a una velocidad regulada. En dos corridas, la temperatura inicial fué de 38° y 45° C. Las temperaturas finales en las masas cocidas fueron aumentadas de 48-54.5° a 64-69.5° C, respectivamente, en unos 20 minutos, y los aumentos en temperatura fueron relativamente uniformes. La disposición de los electrodos al tresbolillo produce el efecto de mezclar la masa cocida. En una instalación de gran capacidad se pueden instalar grupos de electrodos auxiliares o de repuesto para uso cuando se desee, regulados termostáticamente, para mantener la temperatura final deseada. Como el calentamiento se logra rápidamente sin valerse de superficie térmica alguna, el funcionamiento es uniforme; y un punto de suma importancia es que se pueden evitar los aumentos de pureza por completo, si la temperatura final no pasa de la temperatura de saturación. O, la temperatura puede ser aumentada sobre el punto de saturación si la masa caliente puede pasar directamente a las centrífugas, lo que mejoraría en alto grado sus cualidades de purga. En el cristalizador o mezclador también se puede instalar un sistema similar. Ello ofrece múltiples ventajas, como la disminución de recirculación y un importante aumento en la capacidad de las centrífugas y tachos. Los factores económicos de este métodos paracen ser favorables, pero falta verificarlos con los resultados que se obtengan en plantas experimentales. Este proceso ha sido patentado.

■

Nuevo Proceso Eléctrico para la Clarificación de Jugos de Caña

D. N. GHOSH, *9° Congreso,* Sociedad Internacional de Tecnólogos en Caña de Azúcar, India. Trabajo S.M.18 (1956).

Después de haber sido anunciado por primera vez, el proceso de Ghosh fué modificado como sigue: El jugo de caña crudo con un pH inicial de 5.2 se calienta rápidamente a unos 70° C. para coagular los albuminoides, y entonces se neutraliza rápidamente casi a un pH de 6.8 con lechada de cal de 5-10° Baume. Entonces se vuelve a calentar a unos 95° C. para reducir su viscosidad y se envía a una batería de clarificación eléctrica, que consta de una caja horizontal, de madera, provista de placas de hierro de ⅛ de pulgada de espesor, con ½ pulgada de separación, dispuestas verticalmente en un eje de madera. A la primera placa se le aplica corriente directa de 100 voltios para ser tomada de la última placa, de modo que cada placa hace las veces de un electrodo bipolar. El paso de la corriente remueve los coloides residuales en la superficie entre el gas y el jugo en la espuma ascendente parcialmente por absorción, parcialmente por contacto directo con las placas, y principalmente por adsorción superficial del coloidal naciente $Fe(OH)_3$ generado en el jugo. Las sales metálicas Na y K son electrolizadas simultáneamente y el pH del jugo asciende a 8.5 en unos 10 minutos, con lo cual los cuerpos pécticos neutrales del jugo son hidrolizados completamente. Mientras tanto, las caras de las planchas se mantienen limpias por escobillones oscilantes. Después de la remoción de la capa de espuma en la superficie, el jugo se vacía en un tanque y se comienza otro ciclo. El jugo tratado se vuelve a calentar a 80° C. y se mezcla con lodo fosfático tomado después de la segunda filtración en una operación previa. El primer filtrado a un pH alrededor de 8.3, que es transparente y amarillo, es tratado con una solución de superfosfato para reducir el pH alrededor de 6.8, es calentado al punto de ebullición y filtrado por segunda vez. Esto produce un filtrado incoloro casi exento de coloides; el aumento de pureza es alrededor de 4-5 unidades, y el jugo así clarificado es enviado directamente a los evaporadores. El color del jugo concentrado (meladura) es mejor que el que se obtiene por el proceso corriente de sulfitación o por el "nuevo método" de Saha y Jain.

■

Transportador de Caña Accionado Automáticamente

J. H. NICKLIN, *9° Congreso,* Sociedad Internacional de Tecnólogos en Caña de Azúcar, Trabajo No. S.E. 9, India (1956).

Si la caña de azúcar pudiese ser cargada uniformente en un transportador que avanzase a una velocidad constante, nunca ocurrirían los atascamientos que interfieren con el perfecto funcionamiento del tren de molienda. Pero aun cuando la caña es descargada en el transportador con rastrillos, el espesor del colchón de caña varía de un punto a otro; y cuando la caña es vaciada directamente de carros o camiones, se forma una sucesión de montículos, cualesquiera de los cuales puede imponer una carga excesiva a los motores que accionan las cuchillas niveladoras y causar un atascamiento que paraliza el tren de molienda. Esto complica la tarea del encargado de los molinos, quien debe mantener un colchón de caña de espesor uniforme en el canalón que alimenta el primero molino del tándem. En el momento que un montículo de caña pasa por el primer juego de cuchillas, el operador puede suponer que necesita aumentar la alimentación, y proceder a acelerar el transportador, con el resultado que cuando el exceso de carga llega al canalón, puede ocasionar dificultades.

Con la idea de evitar tales sobrecargas y atascamientos, se han empleado diversos dispositivos. Uno de ellos es un amperímetro instalado en cada motor impulsor de cuchillas a plena vista del operador para prevenirlo contra la amenaza de peligro, a fin de que puede reducir la velocidad del transportador. La utilidad de este dispositivo depende del cuidado del operador.

Como medida adicional de seguridad, se instalaron relevadores en cada motor, dispuestos de modo que una válvula corta el sumistro de fuerza y para el transportador varios segundos mientras se corrigen las dificultades en el primer molino, después de lo cual el transportador puede volver a funcionar bajo el mando del operador. A pesar de esta precaución, pueden ocurrir sobrecargas, las que se pueden reducir considerablemente instalando una resistencia permanente en el circuito del motor (tratándose de motores de anillo colector). Este equipo fué mejorado subsiguientemente, haciendo uso de dos relavadores en cada motor (en vez de uno solamente), uno de ellos para reducir la velocidad del transportador un tercio, y el otro para pararlo a 150% de sobrecarga.

A pesar de estas mejoras, el problema no había sido resuelto de un todo, el que consiste en mantener un colchón de caña uniforme en el canalón de alimentación sin intervención del operador. Al fin, el Negociado de Estaciones Experimentales de la Caña de Azúcar en Brisbane, Australia, llegó a resolverlo tras extensos estudios. En el nuevo sistema se conservan los relevadores de carga ya mencionados, que ejercen su función reguladora, pero también incluye una "plantilla de espesor" en el canalón del primer molino que ejerce su función cuando el colchón de caña excede cierto espesor. Cuando el nivel del colchón de caña estó por debajo de la "plantilla de espesor," el transportador funciona a plena velocidad; cuando el colchón llega a la plantilla, ésta es desplazada hacia afuera y pone en movimiento dispositivos que imponen resistencia en el circuito del motor del transportador, lo que reduce su velocidad. El resultado es que se mantiene un nivel uniforme de caña en el canalón no obstante las grandes variaciones que puedan ocurrir en el espesor del colchón de caña en el transportador.

Este dispositivo fué instalado en la Central Mulgrave de Queensland durante la campaña de 1955, el cual dió tan buenos resultados que los directores de la empresa pudieron eliminar la operación manual del equipo de molienda. Esta instalación ofrece un perfecto ejemplo de un tándem completamente automático que funciona por sí solo.

■

Digestor Continuo para Producir Pasta de Papel del Bagazo

JOSEPH E. ATCHISON, *Indian Pulp and Paper,* Vol. 16, No. 1 (1955), cf. "Sugar," Sept. 1955, pág. 63.

El cocedor o digestor de madera, tipo Pandia continuo, primeramente usado hace varios años para hacer pastas burdas para techos, pisos, y tabla aislante, se ha usado últimamente para hacer pasta blanqueable para maderas blandas y duras, y más recientemente se ha usado para hacer pasta blanqueable de alto grado de productos vegetales como paja y bagazo. Un notable ejemplo de su uso para bagazo lo ofrece un aparato de 115 toneladas en la fábrica de pasta y papel de la W. R. Grace and Company en Paramonga, Perú.

La introducción del sistema Pandia en la manufactura de papel ofrece un notable ejemplo de la substitución de un proceso intermitente o por etapas con un proceso continuo que está revolucionando la técnica de muchas industrias, incluso la del azúcar. Tales substituciones ahorran mucho tiempo y costos de mano de obra. El elemento básico del digestor Pandia consta de un tubo horizontal donde va encerrado un conductor en espiral, cuyo tubo puede tener un diámetro de 12" a 36", según la capacidad que se desee. El bagazo es alimentado continuamente desde una tolva. El conductor en espiral conduce al bagazo por el tubo, en el que se inyecta vapor y el licor digestor. La masa en proceso de digestión es impulsada a una velocidad constante y regulada, la que se mezcla continuamente según avanza hasta que es descargada a presión en un ciclón situado sobre un tanque de expansión. El aparato está construído de modo que puede ser operado a temperaturas de 180° a 190° C y presiones hasta 175 libras por pulgada cuadrada. Estas condiciones no se pueden aplicar a digestores giratorios de tipo convencional, de modo que el período de digestión se puede acortar mucho con el sistema Pandia. Para la cochura o digestión se puede usar cualquiera de los medios corrientes, como licor de sosa, Kraft o monosulfato, según el tipo y calidad de pasta o papel que se desee, en tanto que el cambio de un sistema de cochura a otro se puede hacer en una hora. Una ventaja de este sistema es que el bagazo es alimentado al tubo a presión, lo que reduce su volumen considerablemente; esto permite usar 4.5 a 5.0 partes de licor por 1 parte de bagazo por peso, mientras que en el digestor giratorio corriente, la relación tiene que ser de 10 o 12 por 1 para obtener buena circulación y digestión o cochura uniforme. Los digestores giratorios son necesariamente pequeños y de poca capacidad.

Con ciertas modificaciones, el bagazo puede ser cocinado por los procesos en húmedo o en seco. La baja relación de licor también significa menor consumo de vapor, y se puede aprovechar continuamente el calor del tanque de expansión o compensación. En la planta de la W. G. Grace antes mencionada, el período de retención del bagazo en los tubos es sumamento corto—10 minutos o menos, comparado con un período de horas en los sistemas por etapas, de baja presión.

Bajo las condiciones reinantes en muchas regiones productoras de caña, una planta de 25 toneladas por día resultaría económica. Se necesita poco espacio, y la capacidad de la planta podría ser aumentada fácilmente, instalando más tubos en grupos dispuestos verticalmente.

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EL CATALOGO AZUCARERO

(Edición de 1956) es una publicación anual que se distribuye gratuitamente entre personas y firmas interesadas en la adquisición de maquinaria y equipo para la industria azucarera. Si usted desea obtener esta publicación, simplemente diríjanos unas letras escritas en el membrete de su compañía, indicando su ocupación o cargo, al recibo de lo cual nos será grato enviarle un ejemplar de este extenso y auténtico directorio de fabricantes de maquinaria azucarera sin costo ni obligación alguna de su parte.

autor durante las primeras horas sin enfriamento forzado.

8. Como ejemplo, ofrecemos los datos anotados a continuación, resultantes de una modificación efectuada recientemente en la estación de cristalizadores de masas de bajo grado en la fábrica de azúcar de remolacha Vierverlaten, Groningen, Holanda:

Camp.	Pureza Masa C.	Pureza Miel F.	Diferencia Pureza
1953	81.3	63.7	17.6 sin crist. rápido
1954	82.0	64.7	17.3 " " "
1955	80.04	61.5	18.9 " " "

En las compañas de 1953 y 1954, el período de retención promedio fué de unas 32 horas por templa, mientras que en la campaña de 1955 el período de retención fué reducido a unas 21 horas por templa. La última cifra consta de 2 horas en el artesón de depósito, 5 horas de paso a través del cristalizador rápido, y 14 horas después de la cura en cristalizadores ordinarios.

Amsterdam, Holanda
Werkspoor N. V.

Comentarios del Autor

En contestación a la carta de Werkspoor N. V., Amsterdam, deseo hacer los siguientes comentarios, identificando cada párrafo de la carta de Werkspoor a que me refiero.

1. Estoy en favor de un rágimen de enfriamiento lento en cristalizadores porque es un requisito del fenómeno físico de la cristalización de masas cocidas de bajo grado. Es cierto que el enfriamiento lento requiere más espacio en la estación de cristalizadores, pero a la larga resulta más económico instalar cristalizadores adicionales que perder azúcar constantemente en las mieles finales. El mismo autor de la carta dice:

"El resultado de todo esto es una continua concesión entre la capacidad de la fábrica y la pureza de la miel final."

2. No recomendé los cristalizadores "rápidos" sino que sugerí cristalizadores con elementos de enfriamiento bastante amplios para poder acelerar el enfriamiento de masas de bajo grado hacia el fin del período de cura. En este caso mencioné varios tipos de cristalizadores.

3. Puesto que la cristalización de masas de bajo grado en un tacho al vacío es (actualmente) una operación intermitente, no veo neecsidad alguna de cristalizadores continuos en esta fase. De todos modos, se necesitaría alguna clase de recipiente intermedio entre el tacho al vacío y el cristalizador continuo.

4. Un período de retención de 16-17 horas por templa es demasiado corto para curar y agotar la miel final adecuadamente, a menos que la templa sea de bajo Brix o contenga una cantidad excesiva de azúcar invertido. En tales casos, el período de cura no tiene importancia.

Esta conclusión se basa en mi experiencia de más de 30 años en la industria azucarera.

5. Opino que los cristalizadores rápidos pueden ser muy convenientes para masas de alto grado, y especialmente en refinerías para masas de azúcar blanco. No obstante, en mi artículo sólo trataba de masas de caña de azúcar de bajo grado.

6. Durante muchas visitas a la Argentina, donde se encuentra un cristalizador Werkspoor rápido en una fábrica de azúcar, tuve la oportunidad de observar conglomeraciones en muchas masas de bajo grado purgadas después de haber curadas en el cristalizador Werkspoor rápido.

7. Estoy de acuerdo con el autor de la carta en este párrafo.

8. En mi artículo sobre la cristalización de masas de bajo grado me refería a masas de *caña de azúcar* de unos 58° de pureza, mientras que el autor de la carta cita cifras sobre masas de *remolacha* de más de 80° de pureza. La pureza de la miel final de remolacha de 61.5° no es nada extraordinario, y debiera ser 55-58°. Además, el autor de la carta no da Brixes comparativos de esas templas de remolacha. Una templa de bajo grado se puede dejar en el cristalizador indefinidamente sin gran descenso de pureza en la miel final.

V. E. Baikow
Ingeniero Consultor

■

Corrección

Al discutir las normas para la producción de table dura en el informe "Fábrica de Tabla de Bagazo en Construcción en Cuba" (El Mundo Azucarero, Sept. 1956, erróneamente dado como ½ pulgada en página 20), el espesor de la tabla fue vez de ⅛ de pulgada. El pasaje debiera rezar "para ser aceptable, la tabla dura de ⅛ de pulgada debe ener una resistencia a la rotura no menor de 6,000 libras."

January 1957

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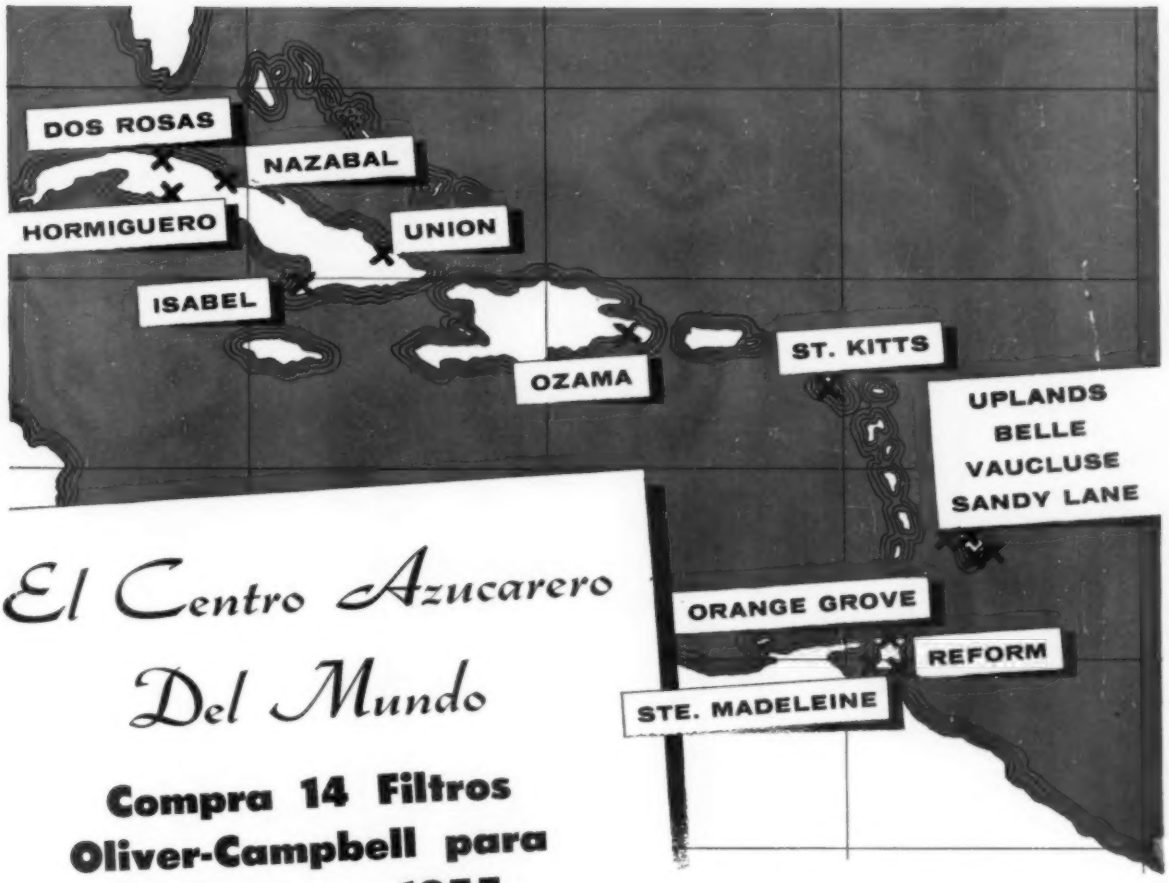
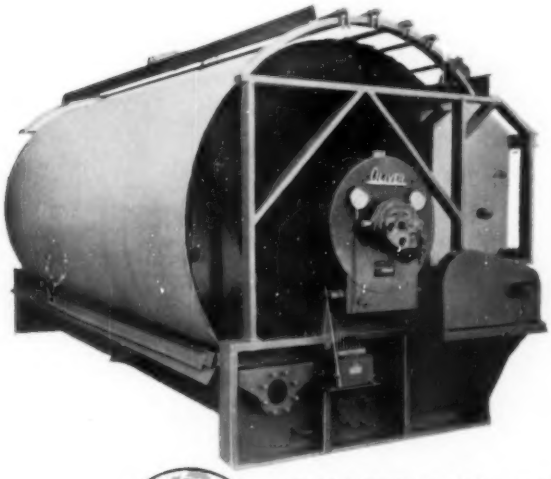


El Centro Azucarero Del Mundo

Compra 14 Filtros Oliver-Campbell para Cachaza en 1955



Las Antillas, con una producción anual de 10 millones de toneladas, se considera como el centro azucarero del mundo.

Tanto aquí como en otras partes del mundo, las principales fábricas de azúcar continúan instalando los filtros Oliver-Campbell para cachaza. En efecto, en 1955 se vendieron 14 de estos notables filtros en las Antillas solamente.

Los filtros Oliver-Campbell están diseñados para muchos años de servicio y funcionamiento económico, e incluyen los últimos adelantos en filtración, lo que da por resultado el perfecto lavado de la cachaza. Sus ventajas funcionales incluyen: menos inversión de sacarosa, menos redisolución de impurezas, más altra puerza del filtrado, estaciones de filtros más limpias, y cuenta exacta del rendimiento de sacarosa.

Para más información sobre los Filtros Oliver-Campbell para Cachaza, solicite un ejemplar del Boletín No. 4093. Dorr-Oliver Incorporated, Cane Sugar Division, Stamford, Connecticut, E. U. A.

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Clarity Measurements in Filtration

by Paul W. Leppla, *Technical Director*

Filtration efficiency is usually measured in terms of flowrate and clarity. Flowrate is readily measured in most plants; however, clarity measurements involve the most difficult aspects of filtration technology. Consequently most industries rely upon visual evaluation of filtrate clarity, which is only semi-quantitative at best and occasionally is purely subjective.

Critical evaluation of filtrate clarity requires instrumental measurement. A number of satisfactory instruments of U.S. manufacture are available. Some measure transmitted light, a questionable technique since few of these instruments discriminate between bleaching of soluble color and the removal of suspended particulates. The measurement of Tyndall or scattered light is much preferred.

Too, the problem of absolute standards is not yet resolved, resulting in confusion on clarity measurements from one laboratory to another. One instrument company has available a series of calibrated standards, which are claimed to be stable, and at least one technical society is working on the development of absolute reference standards so that identical measurements will be possible in different laboratories.

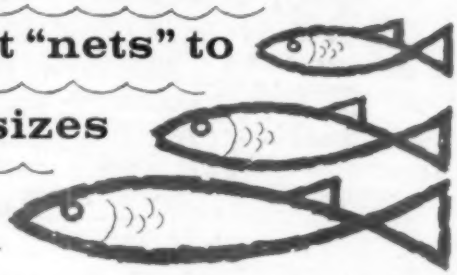
Under these circumstances, evaluating a series of diatomite filteraids is extremely difficult. While Filteraid A may have 90% of the clarification efficiency of Filteraid B in a raw sugar solution, the relative rating in a pectin system may be only 60%. Moreover, the relative clarification of two filteraids with respect to the same liquid may change markedly depending upon the conditions of the test.

Because of the many variables involved which can influence results to an enormous degree, it is imperative that comparative tests duplicate, as nearly as possible, actual plant conditions. Since often this is difficult, many plants rely on the wealth of experience available to them from a leading supplier in this extremely complex field, experience covering many types of liquors, filters and operating conditions.

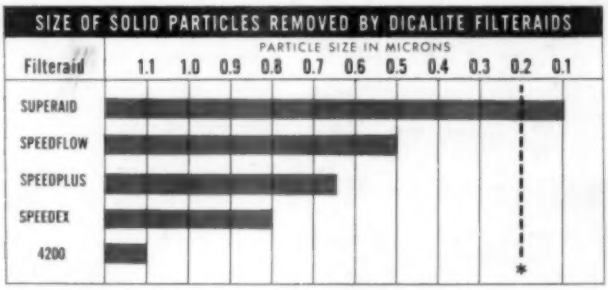
The chart in the accompanying advertisement illustrates a significant step forward in this difficult field recently achieved in the Dicalite laboratory. While it is possible to calculate the average pore size of a filter cake, our scientists have known for some time that particles much smaller than the calculated pore diameter are readily retained by diatomite filteraids. By carefully preparing suspensions of uniformly sized particles in the 1-10 micron range, and conducting laboratory filtration tests under carefully controlled conditions, they were able to determine exactly what size particles can be removed by each of the grades of Dicalite filteraids.

DICALITE FILTERAIDS

let you set "nets" to catch all sizes of "fish"

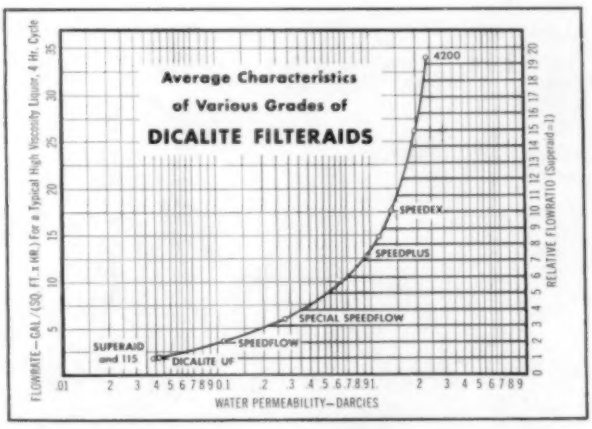


Of course, there's one fundamental difference between fishing and filtration . . . usually, in filtration you're interested in the filtrate, not the 'fish.' But you still have to set the right size 'net' to get the 'fish' out . . . and Dicalite provides a full range of superior filteraids to do just that. The two charts below show (1) the sizes of particulates trapped by different grades of Dicalite and (2) the flowrates to be expected from these grades in typical filtration applications. These data will give you a clear indication of the Dicalite Filteraids which should provide the optimum balance of clarity and flowrate for your particular operation.



*0.2 MICRON — Theoretical limit of resolution of optical microscope. Few microscopes achieve it.

80.0 MICRONS — Smallest particle size visible to the unaided eye at 10" distance.



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